

STAR TREK[®]

25th Anniversary Pinball



"Live long and prosper."

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DATA EAST PINBALL[®]

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CPU JUMPER TABLE

Game	CPU* Version	ROM Location	Jumpers	
			Installed	Removed
Laser Wars	Ver 1	5C	J1b,J3,J4,J6a,J7a,&J8	J1a,J2,J5,J6,&J7b
	Ver 2	5C	J1b,J3,J4,J5a,J6a,J7b,&J8	J1a,J2,J5,J5b,J6b,&J7a
Secret Service	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Torpedo Alley	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Time Machine	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Playboy	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
ABC M.N. Football	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Robocop	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Phantom of the Opera	Ver 2	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Back to the Future	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
The Simpsons	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Checkpoint	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Teen. Mut. Ninja Turtles	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Batman	Ver 3	5B,5C	J1b,J3,J4,J5b,J6b,J7b,&J8	J1a,J2,J5,J5a,J6a,&J7a
Star Trek	Ver 3	5C	J1b,J3,J5,J5b,J6b,J7b,&J8	J1a,J2,J4,J5a,J6a,&J7a

*Version 1 has a 2K RAM which is a 24-pin IC at location 5D.

*Version 2 has an 8K RAM which is a 28-pin IC at location 5D.

Power-up CPU Self Tests

Upon power-up, the CPU board performs a series of self tests of major components. Turn the game on while observing the LEDS on the CPU board. Tests of the PIAs, RAM, and EPROMs are performed automatically and results of the test are indicated by the PIA LED.

With all tests passed, the LEDs illuminate in the following sequence at power turn-on. The PIA and +5V LEDS illuminate immediately. Approximately 1/2-second later the PIA LED goes out and the Blanking LED illuminates; the +5V and Blanking LEDS remain illuminated until the game is turned off. Test failures are indicated with the PIA LED:

PIA LED

Stays On
Flashes 1 Time
Flashes 2 Times
Flashes 3 Times

SUSPECT COMPONENT

One of the 6821 PIAs
6064 RAM at location D5.
EPROM at location B5.
EPROM at location C5.

QUICK REFERENCE FUSE CHART

PPB BOARD

F1 5A Slo-Blo G.I. 6.3VAC
F2 5A Slo-Blo G.I. 6.3VAC
F3 5A Slo-Blo G.I. 6.3VAC
F4 5A Slo-Blo G.I. 6.3VAC
F5 5A Slo-Blo Flipper Power 48VAC
F6 5A Slo-Blo PPB Solenoids/Flash Lamps (34VDC)

POWER SUPPLY BOARD

F1 7A Slo-Blo +5VDC Regulator Input (9VAC)
F2 7A Slo-Blo +5VDC Regulator Input (9VAC)
F3 Not Used
F4 8A Slo-Blo Switched Illumination Buss (18VDC)
F5 4A Slo-Blo Solenoid Buss (34VDC)
F6 5A Slo-Blo Solenoid Buss (34VDC)
F7 0.5A Slo-Blo Display Reg. Input (90VAC)

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GAME SPECIFICATIONS

POWER REQUIREMENTS

This game is provided with a 3-prong plug and **must be connected to a properly grounded outlet to reduce shock hazard** and insure proper game operation. Refer to AC Power Wiring Diagram for transformer connections required for normal, high, and low line conditions.

Normal Line: 109 to 129 Vac (211 to 225 Vac)

High Line: (226 to 235 Vac)

Low Line: 95 to 108 Vac (200 to 210 Vac)

MAJOR ASSEMBLY AND FUSE LOCATIONS

Refer to the Game Illustration (page 2) to identify locations of the major assemblies, and fuse values and locations.

PROM SUMMARY

CPU Board: Location 5B, 5C

Sound Board: Locations U17 (Voice ROM 1), U21 (Voice ROM 2), and U7 (Sound ROM)

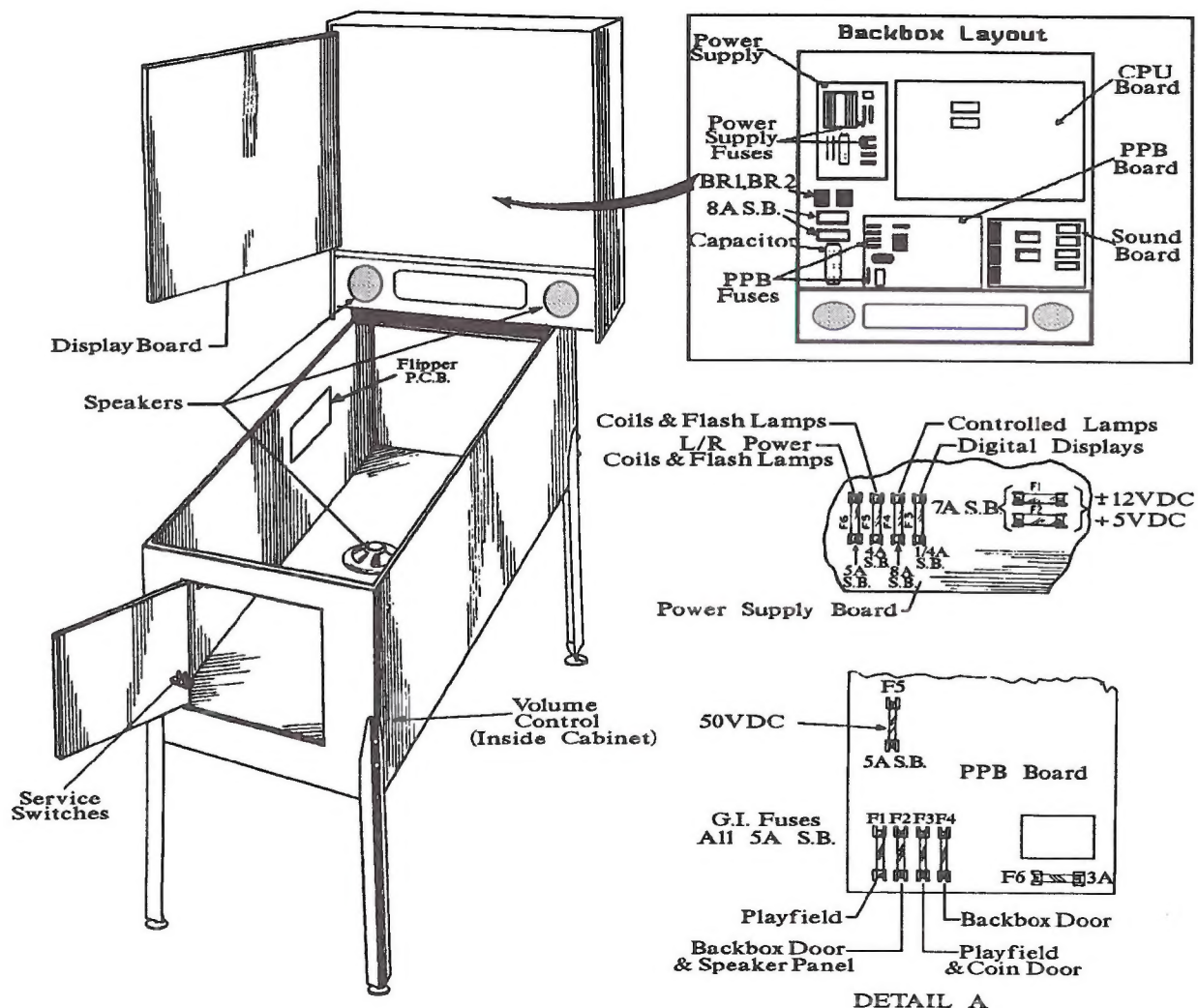
Display Board: Location U8

TRANSPORTATION

To reduce the possibility of damage, observe the following precautions whenever transporting the game. Lower the backbox and secure it to the cabinet. Remove the legs and secure the game within the transporting vehicle.

GAME ASSEMBLY PROCEDURES (Refer to the Game Illustration on page 2)

1. Open the top of the carton and lay it on its side with the bottom of the cabinet down. Using the plastic banding strip as a handle, slide the game out of the carton.
2. Remove all packing material. Locate cabinet legs in filler packing inserts and assembly parts package in the cashbox. There should be four leg levelers, eight leg bolts, three pinballs and a large Allen Wrench used for securing the backbox.
3. Attach leg leveler from the parts package to each leg, make sure that each leveler is threaded through a hex nut before threading it into the leg.
4. Support rear of cabinet and attach rear legs using two leg bolts for each leg.
5. Support front of cabinet and attach front legs using two leg bolts for each leg.
6. While assuring that no cables are being pinched, carefully raise the backbox and secure it in its upright position by inserting the Allen Wrench in the hole in the back of the cabinet and rotating the wrench 270 degrees(3/4 turn).



GAME ILLUSTRATION

7. Remove the backbox keys from the clip on the inside of the coin door and unlock and carefully remove the backglass. Set the backglass aside.
8. Carefully remove the playfield glass and set it aside.
9. Check all connectors in the backbox for loose wire terminations. Reseat any loose wire by pushing in on the terminal.
10. Push on all connectors plugged into the CPU board, Sound Board, Power Supply Boards, and (on insert board) Display board to check that they are properly seated.
11. Check that the fuses on the Power Supply board, PPB board and fuse panel are seated properly.
12. Raise the playfield and the support bar on the right side of the cabinet; support the playfield by inserting the support bar into the countersunk notch on the bottom side.
13. Check all cabinet cable and playfield lamp board connector terminations.

14. Remove the Plumb tilt from the parts package and install on the panel on the inside left of the cabinet. Note that this game is not equipped with a ball roll tilt.

15. Lower the playfield and level the playfield side-to-side by adjusting leg levelers.

16. Using an inclinometer (protractor) adjust the pitch of the playfield to 6.5 degrees. If a pitch indicating meter is not available, adjust the front levelers to the lowest position and extend the rearleg levelers approximately half way out. Readjust side-to-side level as required.

NOTE

The playfield incline affects difficulty of play. Use the recommended incline; game difficulty is best varied using game adjustments.

17. Check the plumb tilt and adjust as required.

18. If desired, perform any self tests at this time. With the insert door closed, carefully reinstall and lock the backglass.

19. Place the three pinballs on the playfield near the outhole and carefully reinstall the playfield glass.

20. If desired, make game pricing and Add-A-Ball, Novelty, or 5-Ball Play adjustments at this time.

GAME OPERATION

STANDARD FEATURES

Insert coin(s), the game makes a sound for the first credit and generates sounds for each subsequent coin and the Player 4 display indicates the number of credits posted. Depress the credit button and a start-up sound is produced, the posted credits are reduced by one, Player 1 display flashes, Player 4 display indicates BALL 1, and a ball is served to the plunger trough. Additional players may be added by depressing the Credit button before the end of ball 1.

The second closure (adjustable) of the plumb bob tilt switch tilts the ball in play. Closure of the slam tilt switch in the coin door ends the current game(s).

At the end of each ball, earned bonuses are collected. At the end of the last ball for the last player and after bonuses are collected, the system produces a random 2-digit number (a multiple of 10; 00 to 90) for a Match feature (adjustable). Matching the last two digits of a player score with this number awards a credit. Players exceeding high score levels receive free credits (adjustable) and are able to enter their initials with the new High Score achieved. The game then proceeds into the game-over mode and then to the attract mode. A custom message (adjustable) can be displayed during the attract mode.

MANUAL PERCENTAGING

This game is equipped with Manual Percentage Adjustment.

As previously with our games, you can either set operator adjustments for a replay percent or you can set a fixed replay score.

If you set operator adjustments for a particular replay percent, the game will compute a recommended score to keep the game at that replay percentage. If a change is recommended and the game coin door is opened, the displays will indicate a recommended replay score to beat and make a sound to alert the operator. By pressing the start button, the score to beat will be changed to the recommended level. If you close the coin door or go into audit or adjustment mode, no score change will be made.

You may choose to ignore the recommended change; for example, you may not think last week's players were the usual crowd. Just close the door and the message will disappear without altering the existing level. Or you may choose to make a different score to beat adjustment; this is done by utilizing adjustment AD02.

GAME SPECIFIC FEATURES

Skill Shot (View Screen)

Shoot Warships (located in the display) with flashing Photon Torpedo Launch button (located at cabinet front).

Multiball

Shoot flashing crystals (1) to Lite the primary Crystal. Shoot the lit Primary Crystal (3) to open the Transporter Ramp (2). Shoot the ball under Transporter Ramp (2) to beam & Transport crew (Located in Back box) Auto 3 Ball begins.

Ramps in multiball collect 500K.
Multiball scores 1 Million Points.

Jackpot

In Multiball, shoot the moving Primary Crystal target (3) to re-open the Transporter Ramp (2). Shoot under the Ramp (2) to collect the Jackpot.

Additional Jackpots require completing the Left & Right Ramps and then shooting the Primary Crystal to open the Transporter.

Jackpot Sequence:

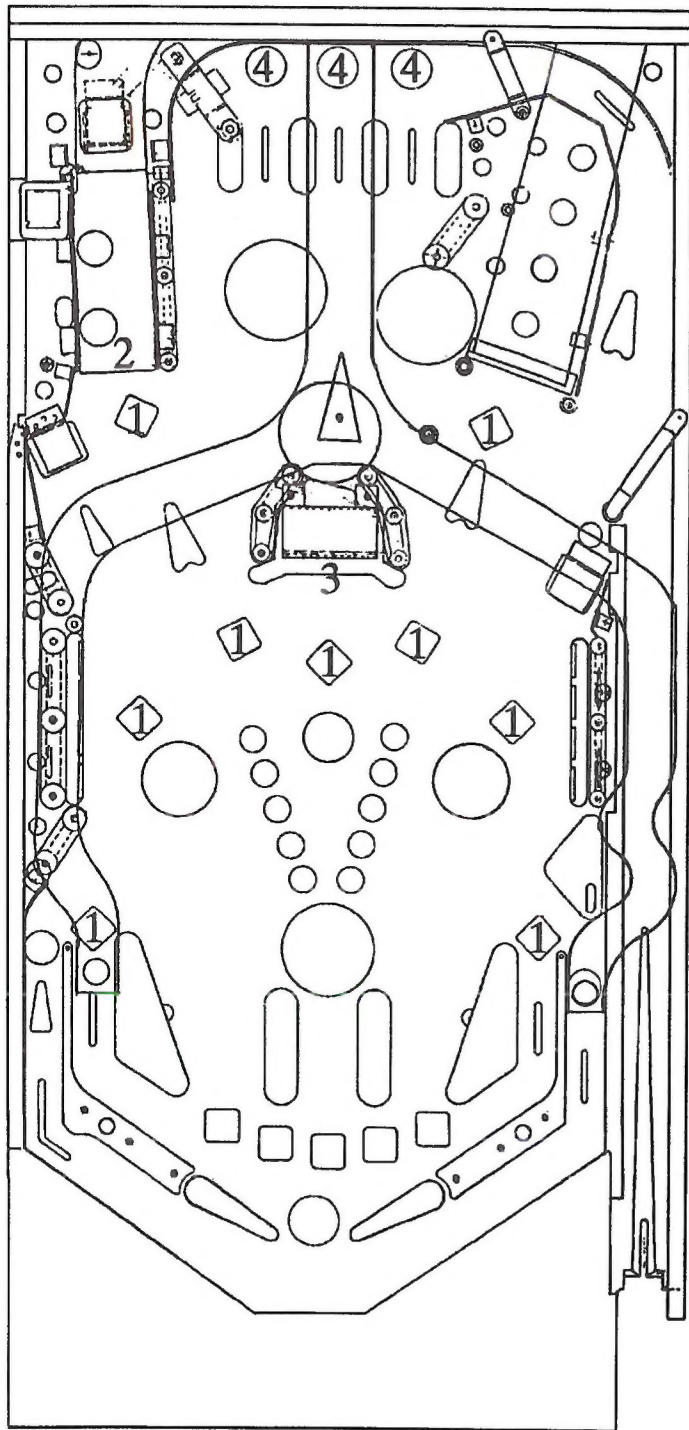
5, 10, 15, 20, 25 Million

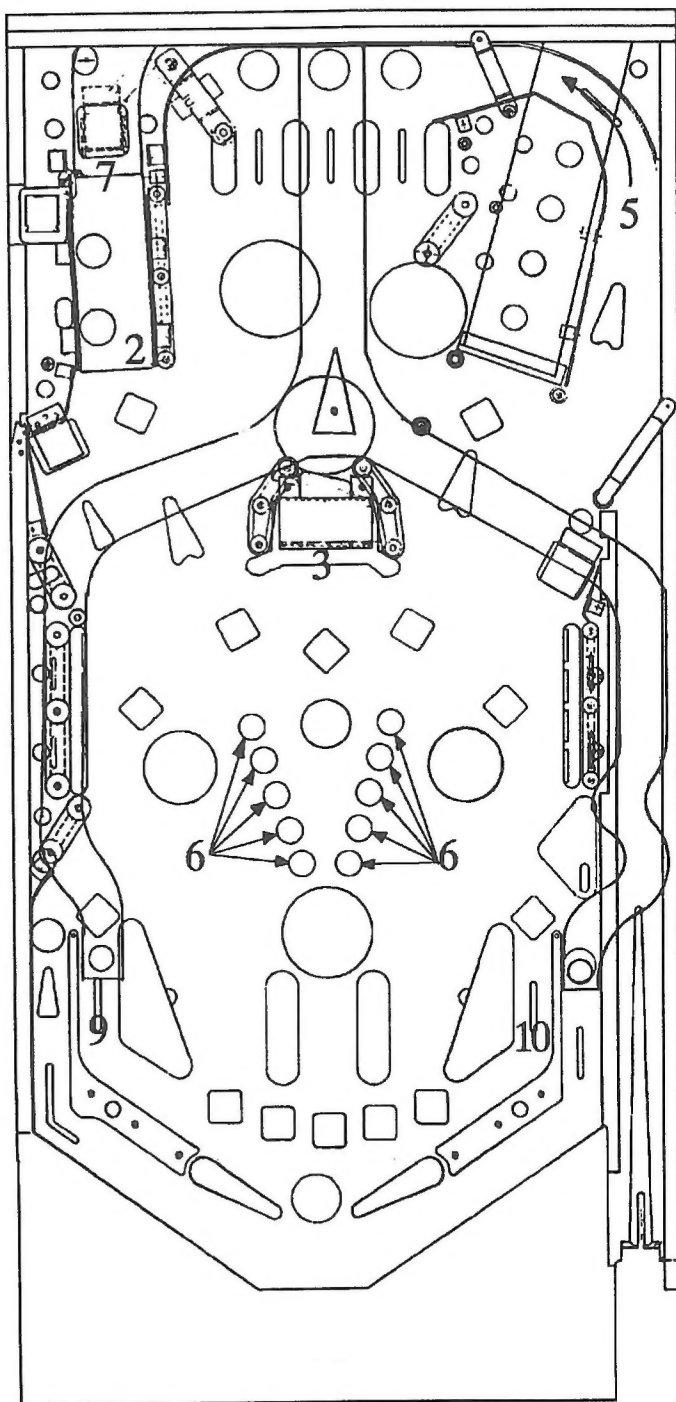
50 Million -Super Jackpot &
100 Million Super Duper Jackpot.

Multiplier

Completing the Top 3 Lanes (4) advances the Multiplier.

The Scanner also lites the " X " Values.





Laser Kick

Shoot Lanes (5) to re-lite Laser Kick (6).
The Scanner will also randomly relite the
Laser Kick

Primary Crystal

Shoot the Primary Crystal (Moving Target) (3)
to advance phasers for Unlimited Millions.
Shoot the Primary Crystal to open the
Transporter for Multiball & Jackpot.

Unlimited Millions

Shoot Left and Right Ramps (7) & (8) or the
Primary Crystal to advance phasers (6). When
phasers (6) are complete, Target (3) is lit for
Unlimited Millions (Timed Event).

Video Mode

Video mode starts with the scanner selection
of Video Mode.

The player has 12 seconds, 10 ships and 10
shots.

Each ship, shot in Video Mode is worth
1,000,000 points. Shooting all 10 ships awards
a 5 Million point Sharp Shooter Bonus.

Ice Planet

During the player's 2nd or 3rd ball the Random Ice planet will begin. Light (11) or (12) will illuminate. Based upon which lamp is lit, complete the associated remaining Drop targets (13) or (14) to collect an Extra Ball for (11) or 10 Million points (12).

Scanners

Shoot Left hole (15) to lite Scanner value.
Shoot Right hole to collect value.

Special

The Special is lit randomly from the Scanner.
Shoot the open Transporter Ramp to collect.

Victory Laps

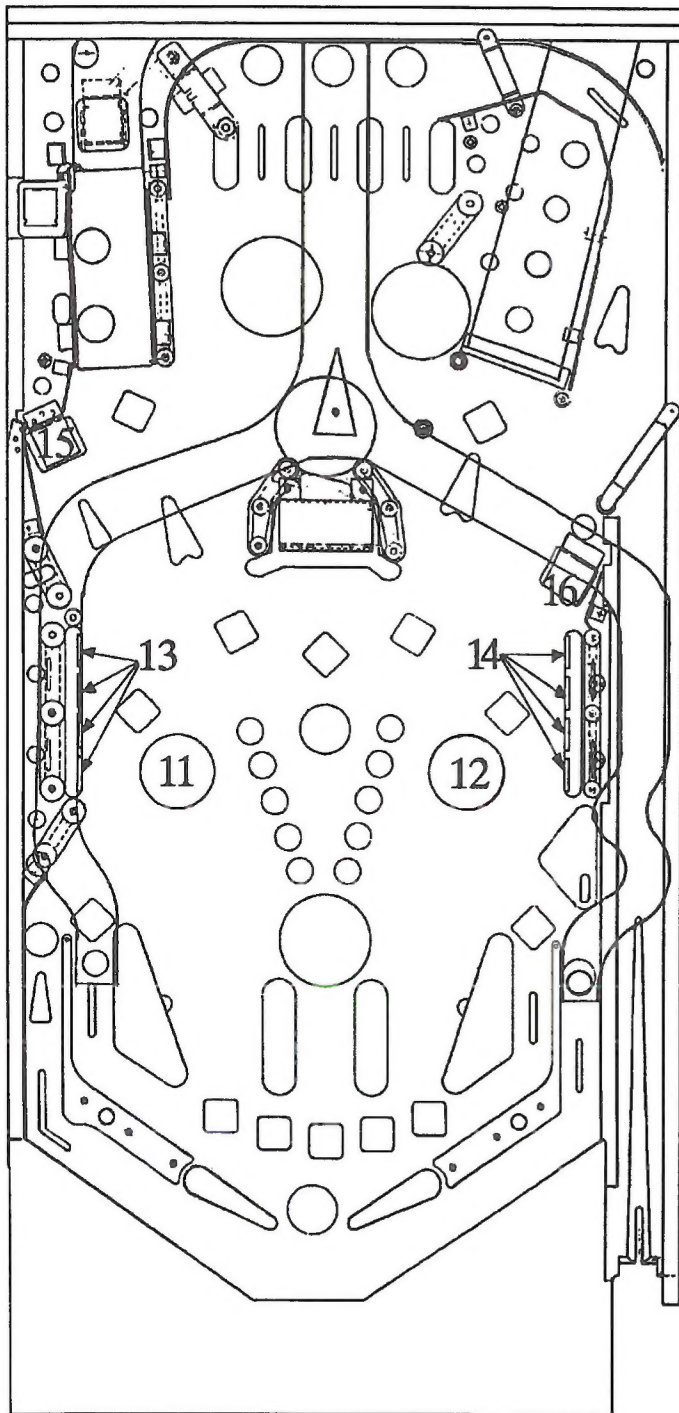
After collecting Replay
shoot the Right and Left Ramps for the next
15 Seconds to earn 1 Million points for each
completed Ramp shot.

Each successive Ramp completion also
advances the Ramp Value by 500K on the
next Ramp shot.

Bonus

5,000 points per switch.
500,000 points maximum.

5 Million points Total Bonus per ball utilizing
the Bonus multiplier.



AUDIT FUNCTIONS

GENERAL

There are 96 audit functions provided for accounting purposes and for evaluation of game difficulty adjustments. Audit functions are split into two groups. There are eight most-used audits (AU01 through AU08) in a 'quick look' group and 85 less-used audits (E AU10 through E AU96), in an 'expanded' group. The various auditing functions are summarized in the **AUDITING FEATURES TABLE** and, when accessed, are shown on the player score displays. The *Audit Number* is shown in the Player 3 Display, the *Description* in the Player 1 and 2 Displays, and the *Audit Total* in the Player 4 Display. Access and control is provided from switches located on the inside of the coin door.

To access audit functions, open the coin door and make sure that the FORWARD/REVERSE switch is in the FORWARD (up) position. Depress the STEP switch and the game name is shown in the Player 1 and 2 displays, the Player 3 display is blank, and the PROM revision level is shown in the Player 4 display. This indicates access to audit functions.

With the FORWARD/REVERSE push-button switch still in the FORWARD (up) position, depressing the STEP push-button switch advances through the audit functions one at a time. To review lower-numbered functions, set the forward/reverse push-button switch to the REVERSE (down) position and operate the STEP push-button switch.

To access expanded audits, operate the step push-button until AU09, EXPAND AUDITS is displayed. Set the choice to ON as indicated in the Player 4 display by depressing the Game Start push-button and then depress the step push-button. The request is installed and E AU10 is displayed. When you exit audits and adjustments, the AU09 setting is returned to off for the next time that a review of audits are required.

Audit totals may be reset to zero using Game Adjustment Ad11, Audits Reset. Game adjustments (Ad01 to Ad13 and E Ad14 to E Ad49) begin after the last audit function (AU09 or E AU96). Once audits functions have been recorded, and if no adjustments are required, you may return the game to the attract mode. If adjustments are required, continue pressing the STEP button until the game adjustments are reached. See Game Adjustments for details.

'QUICK LOOK' FUNCTIONS

Total Paid Credits (AU01) - the total number of paid credits is displayed.

Free Percent (AU02) is Free Total (E AU24) divided by Plays Total (E AU25).

Ball Time Average (in seconds) (AU03) is Total Play Time divided by Total Balls Played (AU10).

Average Game Time (AU04) is the Average Game Time expressed in minutes and seconds.

Coins (AU05, 06, and 07) - These three audit totals are provided to show the amount of coins registered for the left, right, and center coin chutes, respectively.

Total Coins (AU08) is the total number of coins dropped through all 3 coin chutes.

Expand Audits (AU09) permits viewing of expanded audits.

Star Trek Audit Table

Audit Number (Player 3 Display)	Audit Description (Players 1 & 2 Displays: totals in Player 4 Display)	Audit Number (Player 3 Display)	Audit Description (Players 1 & 2 Displays: totals in Player 4 Display)
AU 01	Star Trek PROM ID	E AU 49	6X Made
AU 02	Total Paid Credits	E AU 50	8X Made
AU 03	Free Percent	E AU 51	10X Made
AU 04	Ball Time Average	E AU 52	Skill Shot Lit
AU 05	Game Time Average	E AU 53	Skill Shot 1 Made
AU 06	Coins Left	E AU 54	Skill Shot 2 Made
AU 07	Coins Right	E AU 55	Skill Shot 3 Made
AU 08	Coins Center	E AU 56	Multiball Lit
AU 09	Total Coins	E AU 57	Multiball Award
E AU 10	Expand Audits (ON/OFF)	E AU 58	Jackpot Lit
E AU 11	Balls Total	E AU 59	5 Million Jackpot Awd
E AU 12	Extra Balls Total	E AU 60	10 Million Jackpot Awd
E AU 13	Extra Ball Percent	E AU 61	15 Million Jackpot Awd
E AU 14	Replay 1 Awards	E AU 62	20 Million Jackpot Awd
E AU 15	Replay 2 Awards	E AU 63	25 Million Jackpot Awd
E AU 16	Replay 3 Awards	E AU 64	50 Million Jackpot Awd
E AU 17	Replay 4 Awards	E AU 65	100 Million Jackpot Awd
E AU 18	Total Replays	E AU 66	Left Ice Planet Lit
E AU 19	Replay Percent	E AU 67	Left Ice Planet Award
E AU 20	Total Specials	E AU 68	Right Ice Planet Lit
E AU 21	Special Percent	E AU 69	Right Ice Planet Award
E AU 22	Total Matches	E AU 70	Unlimited Million Lit
E AU 23	Hi Score Wins	E AU 71	1 Unlimited Million Award
E AU 24	High Score Percent	E AU 72	2 Unlimited Million Award
E AU 25	Total Free Plays	E AU 73	3 Unlimited Million Award
E AU 26	Total Games	E AU 74	4 Unlimited Million Award
E AU 27	0.0 - 19.9 Million	E AU 75	5+ Unlimited Million Award
E AU 28	20.0 - 39.9 Million	E AU 76	Scanner Lit
E AU 29	40.0 - 59.9 Million	E AU 77	Scanner Lite Ex.Ball
E AU 30	60.0 - 79.9 Million	E AU 78	Scanner Lite Special
E AU 31	80.0 - 99.9 Million	E AU 79	Scanner Ice Planet Lt.
E AU 32	100 Million Plus	E AU 80	Scanner Ice Planet Rt.
E AU 33	Average Scores	E AU 81	Scanner Laser Kick
E AU 34	Games 1Player	E AU 82	Scanner Multiball
E AU 35	Games 2Player	E AU 83	Scanner Unlimited Mil.
E AU 36	Games 3Player	E AU 84	Scanner Video Mode
E AU 37	Games 4Player	E AU 85	Scanner Maximum 'X'
E AU 38	Attract Minutes	E AU 86	Scanner Fast Scoring
E AU 39	Cycles H.S. Reset	E AU 87	Scanner Super Bumpers
E AU 40	Coins No Credit	E AU 88	Scanner Shields Up
E AU 41	Service Credits	E AU 89	Scanner Lite Crystal
E AU 42	Drains Left	E AU 90	Scanner Mystery Millions
E AU 43	Drains Center	E AU 91	Scanner Multiplier
E AU 44	Drains Right	E AU 92	Scanner Mystery Score
E AU 45	Left Ramp Shots	E AU 93	Outlane Special Lit
E AU 46	Right Ramp Shots	E AU 94	Outlane Special Award
E AU 47	Ramp Millions Enabled	E AU 95	Shields Used
E AU 48	2X Made	E AU 96	# Of Victory Shots
	4X Made		

EXPANDED FUNCTIONS

Balls Total (E AU10) is the total of regular and extra balls.

Extra Balls Total (E AU11) is the total number of extra balls awarded.

Extra Ball Percentage (AU12) is AU11 divided by Plays Total (AU25).

Replay Awards (E AU13 through 16) provide the total awards (credit, extra ball, or audit) for replay levels 1 through 4, respectively.

Total Replays (E AU17) is the total awards (credits, extra balls, or audit only) for exceeding replay score levels.

Replay Percentage (E AU18) is the Replay Total awards for exceeding replay score levels (E AU17) divided by Plays Total (E AU25).

Total Specials (E AU19) is the total awards (credits, extra balls, or scores) for making specials.

Special Percentage (E AU20) is Special Total (E AU19) divided by Plays total (E AU25).

Match Total (E AU21) is the total credits awarded for matching the last two digits of the score with the system-generated Match Number at the end of the game. Percentage of match credits will be adjustable from 0% to 10%, by E Ad 14 if enabled.

High Score Wins (E AU22) is the total credits awarded for exceeding the high-score-to-date scores.

High Score Percentage (E AU23) is High Score Wins (E AU22) divided by Plays Total (E AU25).

Total Free Plays (E AU24) is the total free credits for replays, high-score-to-date, specials, and match.

Total Games (E AU25) is the sum of Total Paid Credits (AU01) and Free Total (E AU24). Note that free credits are not recorded in the audits until they are actually used.

0.0 - 19.9 Million (E AU26) provides the total number of games the Player's final score was between 0 and 19,999,990 points.

20.0 - 39.9 Million (E AU27) provides the total number of games the Player's final score was between 20,000,000 and 39,999,990 points.

40.0 - 59.9 Million (E AU28) provides the total number of games the Player's final score was between 40,000,000 and 59,999,990 points.

60.0 - 79.9 Million (E AU29) provides the total number of games the Player's final score was between 60,000,000 and 79,999,990 points.

80.0 - 99.9 Million (E AU30) provides the total number of games the Player's final score was between 80,000,000 and 99,999,990 points.

100 Million Plus (E AU31) provides the total number of games the Player's final score was over 100,000,000 points.

Average Scores (E AU32) provides the Average Score by adding the Final Score of each game to a table and dividing this sum by the Total Plays .

Games - Player (E AU33 through 36) provide individual totals of 1- player, 2-player, 3-player, and 4-player games, respectively.

Attract Minutes (E AU37) provides the number of minutes the game is in Attract Mode (Factory use).

Cycles High Score Reset (E AU38) provides the number of times that the high score levels have been automatically reset (if enabled).

Coin No Credit (E AU39) provides the number of times the coin switch was closed without awarding credit(s)-This option is used in multiple coin conditions.(ie. 2 quarters 1 Play)

Service Credits (E AU40) provides the total number of Service credits added to the game. *See Game Diagnostics on page 19 for instructions regarding entry of Service Credits.*

Drains Left (E AU41) provides the number of times the ball drained out the left drain.

Drains Center (E AU42) provides the number of times the ball drained out the center drain.

Drains Right (E AU43) provides the number of times the ball drained out the right drain.

GAME SPECIFIC FUNCTIONS

Left Ramp Shots (E AU44) provides the total number of times the Left Ramp was completed.

Right Ramp Shots (E AU45) provides the total number of times the Right Ramp was completed.

Ramp Millions Enabled (E AU46) provides the total number of times the Ramp Millions feature was enabled.

2X Made (E AU47) provides the number of times 2X bonus was enabled.

4X Made (E AU48) provides the number of times 4X bonus was enabled.

6X Made (E AU49) provides the number of times 6X bonus was enabled.

8X Made (E AU50) provides the number of times 8X bonus was enabled.

10X Made (E AU51) provides the number of times 10X bonus was enabled

Skill Shot Lit (E AU52) provides the number of times the Skill shot was lit.

Skill Shot 1 Made (E AU53) provides the number of times was completed on the first Ball.

Skill Shot 2 Made (E AU54) provides the number of times was completed on the second Ball

Skill Shot 3 Made (E AU55) provides the number of times was completed on the third or greater Ball

Multiball Lit (E AU56) provides the number of times the Multiball feature was lit.

Multiball Award (E AU57) provides the number of times the Multiball feature was achieved.

Jackpot Lit (E AU58) provides the total number of times the Jackpot feature was active during Multiball.

5 Million Jackpot Awd (E AU59) provides the number of times the Jackpot feature awarded 5 Million points.

10 Million Jackpot Awd (E AU60) provides the number of times the Jackpot feature awarded 10 Million points.

15 Million Jackpot Awd (E AU61)provides the number of times the Jackpot feature awarded 15 Million points.

20 Million Jackpot Awd (E AU62) provides the number of times the Jackpot feature awarded 20 Million points.

25 Million Jackpot Awd (E AU63) provides the number of times the Jackpot feature awarded 25 Million points.

50 Million Jackpot Awd (E AU64) provides the number of times the Jackpot feature awarded 50 Million points.

100 Million Jackpot Awd (E AU65) provides the number of times the Jackpot feature awarded 100 Million points.

Left Ice Planet Lit (E AU66) provides the number of times the Left Ice Planet was lit.

Left Ice Planet Award (E AU67) provides the number of times the Left Ice Planet awarded an Extra Ball.

Right Ice Planet Lit (E AU68) provides the number of times the Right Ice Planet was lit.

Right Ice Planet Award (E AU69) provides the number of times the Right Ice Planet awarded 10 Million points.

Unlimited Million Lit (E AU70) provides the number of times the Unlimited Millions feature was lit.

1 Unlimited Million Award (E AU71) provides the number of times the Unlimited Millions feature awarded only 1 Million Points.

2 Unlimited Million Award (E AU72) provides the number of times the Unlimited Millions feature awarded only 2 Million Points.

3 Unlimited Million Award (E AU73) provides the number of times the Unlimited Millions feature awarded only 3 Million Points.

4 Unlimited Million Award (E AU74) provides the number of times the Unlimited Millions feature awarded only 4 Million Points.

5+ Unlimited Million Award (E AU75) provides the number of times the Unlimited Millions feature awarded 5 Million Points or greater.

Scanner Lit (E AU76) provides the number of times the Scanner was lit by completing the Left Hole Shot.

Scanner Lite Ex.Ball (E AU77) provides the number of times the Scanner lit the Extra Ball shot.

Scanner Lite Special (E AU78) provides the number of times the Scanner lit the Special shot.

Scanner Ice Planet Lt. (E AU79) provides the number of times the Scanner lit the left Ice Planet feature.

Scanner Ice Planet Rt. (E AU80) provides the number of times the Scanner lit the Right Ice Planet feature.

Scanner Laser Kick (E AU81) provides the number of times the Scanner re-lit the Laser Kick.

Scanner Multiball (E AU82) provides the number of times the Scanner initiated Multiball.

Scanner Unlimited Mil. (E AU83) provides the number of times the Scanner enabled the Unlimited Million feature.

Scanner Video Mode (E AU84) provides the number of times the Scanner initiated Video Mode play on the display.

Scanner Maximum 'X' (E AU85) provides the number of times the Scanner awarded the 10X Multiplier.

Scanner Fast Scoring (E AU86) provides the number of times the Scanner initiated the Fast Scoring Feature.

Scanner Super Bumpers (E AU87) provides the number of times the Scanner enabled the Super Bumpers feature.

Scanner Shields Up (E AU88) provides the number of times the Scanner enabled the Shields Up feature.

Scanner Lite Crystal (E AU89) provides the number of times the Scanner spotted an unlit Crystal.

Scanner Mystery Millions (E AU90) provides the number of times the Scanner awarded Mystery Millions.

Scanner Multiplier (E AU91) provides the number of times the Scanner incremented the Bonus Multiplier.

Scanner Mystery Score (E AU92) provides the number of times the Scanner awarded a Mystery score.

Outlane Special Lit(E AU93) provides the total number of times the Outlane Special was lit .

Outlane Special Award(E AU94) provides the total number of times the Lit Outlane awarded a Special.

Shields Used (E AU95) provides the number of times Shields feature returned the ball to the player.

of Victory Shots (E AU96) provides the number of times the game awarded 1 Million points plus 500,000 for each successive shot, by completing the Ramp during Victory Mode.

GAME ADJUSTMENTS

GENERAL

There are 49 adjustable functions provided to vary difficulty of play and to periodically reset audits and the high score levels. The various game adjustments are summarized in the **Game Adjustments Table** and, when accessed, are shown on the player score displays. The *Adjustment Number* is shown in the Player 3 Display, the *Description* in the Player 1 and 2 Displays, and the setting in the Player 4 Display. Access and control is provided from switches located on the inside of the coin door.

Game adjustments are accessed from the audit mode. With the audits displaying game identification and the FORWARD/REVERSE switch in the REVERSE (down) position, depress the STEP switch and E Ad49 (Expanded Adjustment 49) is shown in the Player 3 display, FACTORY RESTORE is shown in the Player 1 & 2 displays, and OFF is shown in the Player 4 display. With the audits displaying AU09 (or expanded E AU96) and the FORWARD/REVERSE switch in the FORWARD (up) position, depress the STEP switch and Ad01 is shown in the Player 3 display, REPLAY MANUAL/FIXED is shown in the Player 1 and 2 displays, and the setting is shown in the Player 4 display.

With the FORWARD/REVERSE switch in the FORWARD (up) position, depressing the STEP switch advances through the game adjustments one at a time. With it in the REVERSE (down) position, the STEP switch selects lower-numbered adjustments. To rapidly scroll through adjustments, hold the STEP switch depressed. Adjustment values are changed by operating the GAME START push-button. The FORWARD/REVERSE switch setting determines whether the values are increased or decreased. (With the FORWARD/REVERSE switch up, the value increases, with it down, the value decreases). When the STEP switch is depressed the Player 1 and 2 displays indicate REQUEST INSTALLED.

REPLAY AND GENERIC FEATURES

Replays may be adjusted either for fixed levels or for a system-adjusted manual percentage of replay awards. Four levels may be selected. Adjustments allow awarding of a credit or an extra ball as each level is exceeded. With the manual percentage feature, if the actual replay percentage is higher or lower than that desired, the game computes new recommended manual percentage score(s). When the coin door is subsequently opened the player displays indicate the recommended level and a sound is made to alert the operator of a potential change. This new level is entered into adjustments simply by pressing the game start push-button. (If the coin door is closed or you enter audits/adjustments or diagnostics, the replay level is not changed.)

REPLAYS (Ad 01 through 06)

Ad 01 Replay Manual/Fixed

- **Manual:** Adjust for percentage of awards for replay levels (1% through 50%). Proceed to Ad 02 and 03 for starting replay levels.
- **Fixed:** Lower the automatic value below 1% and Player 1 display indicates FIXED. Proceed to Ad 02 and 03 for fixed replay levels.

Ad 02 Start Replay

- **Manual:** Adjust the starting Replay 1 setting to between 100,000 and 99,900,000.

Ad 03 Levels Replay/Level 1,2,3 & 4 Replay

- Adjust the number of replay levels to be active (1 to 4). Any additional starting replay levels are automatically set to values higher than Replay 1
- Adjust Replay 1 level to between 100,000 and 99,900,000. (Same as Start Replay)
If Ad 03 is set for 2, adjust Replay 2 level to between 100,000 and 99,900,000.
If Ad 03 is set for 3, adjust Replay 3 level to between 100,000 and 99,900,000.
If Ad 03 is set for 4, adjust Replay 4 level to between 100,000 and 99,900,000.

Star Trek

Game Adjustment Table

Adjustment Number (Player 3)	Description (Players 1 & 2)	Factory Setting (Player 4)
Ad 01	Replay/Manual	10%
Ad 02	Start Replay	80,000,000
Ad 03	Levels Replay *	01
Ad 04	Game Awards	CREDIT
Ad 05	Limit Freegame	03
Ad 06	Limit Extraball	03
Ad 07	Game Rules	FACTORY
Ad 08	Game Price*	USA2
Ad 09	Game Cleaned	NO
Ad 10	Coin Reset	NO
Ad 11	Audits Reset	NO
Ad 12	Restore H.S.T.D.	NO
Ad 13	Expand Adjustments	NO
E Ad 14	Match Percent	08
E Ad 15	Balls Per Game	03
E Ad 16	Tilt Warnings	01
E Ad 17	Replay Boost	NO
E Ad 18	Credits Limit	30
E Ad 19	High Scores Allowed	YES
E Ad 20	Hiscore 1 Awards	03
E Ad 21	Hiscore 2 Awards	01
E Ad 22	Hiscore 3 Awards	00
E Ad 23	Hiscore 4 Awards	00
E Ad 24	Backup World Record	90,000,000
E Ad 25	Backup Hiscore 1	85,000,000
E Ad 26	Backup Hiscore 2	80,000,000
E Ad 27	Backup Hiscore 3	75,000,000
E Ad 28	Backup Hiscore 4	70,000,000
E Ad 29	Backup Hiscore 5	65,000,000
E Ad 30	Reset H.S.T.D. Every	700
E Ad 31	Clean Game Every	1500
E Ad 32	Free Play	NO
E Ad 33	Custom Mesage	ON
E Ad 34	Attract Mode Music	ON
E Ad 35	Flash Lamps	NORMAL
E Ad 36	Coils Pulse	NORMAL
E Ad 37	Level Adjust By	ANY
E Ad 38	Install Country	USA
E Ad 39	Recall Crystals	YES
E Ad 40	Recall Phasers	YES
E Ad 41	Recall Scanner	YES
E Ad 42	Unlimited Million Style	ON
E Ad 43	Unlimited Million Timer	FACTORY
E Ad 44	Jackpot Timer	FACTORY
E Ad 45	Multiball Timer	FACTORY
E Ad 46	Spot Drop Crystals	ON
E Ad 47	Video Mode	ON
E Ad 48	Hook Promo	ON
E Ad 49	Factory Restore	OFF

* Some settings result in Drop-Down Tables- See Text

Ad 04 Game Awards Set for replays to award: **CREDIT, EXTRA BALL, NONE** or **SPECIAL** (when score threshold is achieved a playfield special is lit).

Ad 05 Limit FreeGame - Adjust for the maximum number of free games that may be accumulated per game; 0 to 9.

Ad 06 Limit Extra Balls - Adjust for the maximum number of extra balls that may be accumulated per game; 1 to 9 or OFF.

SINGLE-FUNCTION DIFFICULTY ADJUSTMENT (Ad 07)

Any one of five INSTALL settings for this adjustment may be activated to automatically select settings for multiple adjustments affecting game difficulty. Use the Start button to choose the difficulty level you require and press the step button to activate the setting. After activation, the individual adjustments may be readjusted if desired. Refer to Install Adjustment Table for details.

Ad 07 Game Rules - Set to **EXTRA EASY, EASY, FACTORY, HARD** or **EXTRA HARD**.

Install Adjustment	E Ad07 Extra Easy	E Ad07 Easy	E Ad07 Factory	E Ad07 Hard	E Ad07 Extra Hard
E Ad 39 Recall Crystals	YES	YES	YES	YES	NO
E Ad 40 Recall Phasers	YES	YES	YES	YES	NO
E Ad 41 Recall Scanner	YES	YES	YES	NO	NO
E Ad 42 Unlim. Million Style	ON	ON	ON	OFF	OFF
E Ad 43 Unlim. Million Timer	EXEASY	EASY	FACTORY	HARD	EXHARD
E Ad 44 Jackpot Timer	EXEASY	EASY	FACTORY	HARD	EXHARD
E Ad 45 Multiball Timer	EXEASY	EASY	FACTORY	HARD	EXHARD
E Ad 46 Spot Drop Crystals	ON	ON	ON	OFF	OFF

NOVELTY / 5-BALL/ADD-A-BALL SETTINGS

The following three combinations are recommended for situations where local laws restrict certain game features regarding the use of replays or the number of balls per game:

Novelty Play Rules - Set to establish recommended settings for no free play or extra balls:

Ad 01 Manual Replay = Fixed
Ad 02 Start Replay = 00
Ad 03 Levels Replay = None
Ad 04 Game Awards = None
Ad 05 Limit Freegame = 0

Ad 06 Limit Extra Balls = 0
E Ad 14 Match Percent = Off
E Ad 20 World Record Awards = 0
E Ad 21-23 Todays 1-3 Awards = 0

5-Ball Play Rules - Set to establish recommended settings for 5-ball play:

Ad 01 Manual Replay = 07%
Ad 02 Replay Start = 90,000,000
Ad 03 Replay Levels = 01
Ad 04 Game Awards = Credit
Ad 05 Limit Freegame = 3
Ad 06 Limit Extra Balls = 3

E Ad 14 Match Percent = 04
E Ad 15 Balls/Game = 5
E Ad 20 World Record Awards = 3
E Ad 21 Todays 1 Award = 1
E Ad 39 Recall Crystals = Yes
E Ad 40 Recall Phasers = Yes

E Ad 41 Recall Scanner = No
E Ad 42 Unlim. Million Style = Off
E Ad 43 Unlim. Million Timer = Factory
E Ad 44 Jackpot Timer = Factory
E Ad 45 Multiball Timer = Factory
E Ad 46 Spot Drop Crystals = Off

Extra Ball Settings-To disable awarding of credits and provide awards with an extra ball make the following adjustments:

Ad 04 Game Awards = Extra Ball
Ad 05 Limit Freegame = 0
E Ad 14 Match Percent = OFF

E Ad 19 Scores Highest = No
E Ad 20 to 23 World Record & Todays High Awards = 0

GAME PRICING (Ad 08)

There are two methods available for coin switch programming; Standard and Custom. Standard pricing uses a single adjustment (Ad 08) to select a pricing scheme shown in the **Standard /Custom Pricing Table**. Custom pricing is used to select additional pricing schemes defined by a Drop Down menu.

With Ad 08 set to **CUSTOM** operating the step button again initiates a drop down menu representing coin switch pulses for the left, right, and center coin slots. The prescribes the number of pulses required for one credit. For example, if *Left Coin Pulses*, was set to 02 and *Coin Switch Pulses Required for 1 Credit*, to 01 a coin in the left slot would produce two credits. Further, if *Left Coin Pulses*, was set to 01 and *Coin Switch Pulses Required for 1 Credit*, to 02, two coins in the left slot would be required for one credit.

Coin Switch Pulses Required for Bonus Credit may be set to post bonus credits when a minimum amount of coins are inserted at one time. For example, if *Left Coin Pulses* was set to 01, *Coin Switch Pulses Required for 1 Credit* to 01 and *Coin Switch Pulses Required for Bonus Credit* to 04, one credit would be posted for each of the first three coins in the left slot and two credits for the fourth coin.

Standard/Custom Pricing - Set for the desired pricing scheme from the Standard Pricing Table as indicated in the Player 1 and 2 displays. For Custom Pricing, set to **CUSTOM**. When set to CUSTOM, the following adjustments are utilized to tailor each individual coin chute.

- 4 **Left Coin Switch Pulses** - Set the number of pulses registered for closure of the left coin switch; 00 to 99.
- 1) **Right Coin Switch Pulses** - Set the number of pulses registered for closure of the right coin switch; 00 to 99.
- 2 **Center Coin Switch Pulses** - Set the number of pulses registered for closure of the center coin switch; 00 to 99.
- 4 **Coin Switch Pulses Required for 1 Credit** - Set the number of coin switch pulses required to post one credit; 00 to 99.
- 1 **Coin Switch Pulses Required for Bonus Credit** - Set the number of coin switch pulses required to award a bonus credit; 00 to 99.

CUSTOM PRICING TABLE

Coin Mechs			Plays/Coins	Ad08	Adjustments				
Left	Right	Center			Left P	Right P	Mid P	Pulse/1Cr	Puls/bon
25¢	25¢	\$1.00	1/25¢ 3/50¢ 1/25¢ 5/\$1.00 1/25¢/ 6/\$1.00	Custom Custom Custom	01 01 05	01 01 05	04 04 20	01 01 04	02 04 20
5SCH	10SCH	10SCH	1/10 SCH 1/10 SCH 4/30SCH	Custom Custom	01 04	02 08	02 08	02 06	00 00
20¢	\$1.00	--	1/20¢ 1/60¢ 2/\$1.00	Custom Custom	01 01	05 05	00 00	01 03	00 05
10P	10P	50P	1/10P 6/50P 1/20P 3/50P	Custom Custom	01 01	01 01	05 05	01 02	05 05

STANDARD PRICING TABLE

Ad 08 Standard Pricing Select			Coin Mechs			Plays/Coins		
1	2	4	Left	Center	Right	Left	Center	Right
USA1	1COIN	1PLAY	25¢	\$1.00	25¢	1 PLAY/ 1COIN	4 PLAY/ 1COIN	1 PLAY/ 1COIN
USA2	4 COINS	3PLAYS	25¢	\$1.00	25¢	1 PLAY/ 2COIN 2 PLAY/ 3COIN 3 PLAY/ 4COIN	3 PLAY/ 1COIN	1 PLAY/ 2COIN 2 PLAY/ 3COIN 3 PLAY/ 4COIN
USA3	2 COINS	1 PLAY	25¢	\$1.00	25¢	1 PLAY/ 2COIN	2 PLAY/ 1COIN	1 PLAY/ 2COIN
USA4	2COINS	1 PLAY 1COIN BUY-IN	25¢		25¢	2 COINS FOR THE 1st PLAY 1PLAY/ 1 COIN ONLY DURING BUY-IN		
AUSTRIA COINAGE			5 SCH	10 SCH	10SCH	1 PLAY/ 2COIN 2 PLAY/ 3COIN 3 PLAY/ 4COIN	1 PLAY/ 1COIN 3 PLAY/ 2COIN	1 PLAY/ 1COIN 3 PLAY/ 2COIN
AUSTRALIA COINAGE			20¢	\$1.00	\$2.00	1 PLAY/ 3COIN	2 PLAY/ 1 COIN	4 PLAY/ 1COIN
UK COINAGE			10P	50P	£1	1 PLAY/ 3COIN	2 PLAY/ 1COIN	5 PLAY/ 1COIN
SWISS 1 SWISS 2			1 SFR	2 SFR	5 SFR	Same as German 1 Same as German 2		
BELGIUM COINAGE			20f	50f	20f	1 PLAY/ 1COIN	3 PLAY/ 1COIN	1 PLAY/ 1COIN
GERMAN 5DM 1		7 PLAYS	1DM	2DM	5DM	1 PLAY/ 1COIN	2 PLAY/ 1COIN	7 PLAY/ 1COIN
GERMAN 5DM 2		9 PLAYS	1DM	2DM	5DM	1 PLAY/ 1COIN 3 PLAY/ 2COIN 5 PLAY/ 3COIN 7 PLAY/ 4COIN 9 PLAY/ 5COIN	3 PLAY/ 1COIN 7 PLAY/ 2COIN 10 PLAY/ 3COIN 14 PLAY/ 4COIN	9 PLAY/ 1COIN
NETHERLAND COINAGE			1 Guilder	1 Guilder	2.5Guilder	1 PLAY/ 1COIN	1 PLAY/ 1COIN	3 PLAY/ 1COIN
SWEDEN COINAGE			1Kr	5Kr	5Kr	1 PLAY/ 3COIN 2 PLAY/ 5COIN	2 PLAY/ 1COIN	2 PLAY/ 1COIN
FRANCE 1 COINAGE			1f	5f	10f	1 PLAY/ 3COIN 2 PLAY/ 5COIN	2 PLAY/ 1COIN	5 PLAY/ 1COIN
FRANCE 2 COINAGE			1f	5f	10f	1 PLAY/ 5COIN	1 PLAY/ 1COIN	3 PLAY/ 1COIN
ITALY COINAGE			500L		500L	1 PLAY/ 1COIN		1 PLAY/ 1COIN
SPAIN COINAGE			25P		100P	1 PLAY/ 1COIN		5 PLAY/ 1COIN
JAPAN COINAGE					100¥			1 PLAY/ 1COIN 3 PLAY/ 2COIN

ADDITIONAL GENERIC FEATURES

Ad 09 Game Cleaned - When enabled (set to **YES**) the game cleaning counter will be reset to zero and Game Clean-Me Green light will go out when STEP is depressed. (Also see E Ad31.)

Ad 10 Coin Reset - When enabled (set to **YES**) all coin and paid credit totals will be reset to zero when STEP is depressed.

Ad 11 Audits Reset - When enabled (set to **YES**) all audit totals except for coins and paid credits will be reset to zero when STEP is depressed.

Ad 12 Restore High Score - When enabled (set to **YES**) the High Score Levels and associated initials will be restored to backup settings when STEP is depressed .

Ad 13 Expand Adjustments - When set to **NO**, depressing the STEP push-button advances directly to E Ad 45, FACTORY RESTORE. When set to **YES**, depressing the STEP push-button sequences through the expanded adjustments. When exiting from expanded adjustments, this function is reset to **OFF** for the next time that adjustments are required.

E Ad 14 Match Percent- Set Match percent from 00% to 10% or **OFF**. At 00% the match display occurs at the end of the game but never awards a credit.

E Ad 15 Balls Per Game - Adjust the number of balls per game; 2 to 5.

E Ad 16 Tilt Warnings - Adjust the number of plumb bob tilt switch closures before the ball in play is tilted; 1 to 3 or **OFF**.

E Ad 17 Replay Boost - Set to **YES** or **NO**. When set to **YES**, exceeding a replay will set a temporary replay level for each time a replay level is surpassed. This new level will equal the player's final score (when the replay was awarded) for each following game, until the replays have all been played. At this time the previous level is resumed.

E Ad 18 Credits Limit - Adjust the maximum number of credits that may be posted; 4 to 50.

HIGH SCORE LEVELS (E Ad 19 through 30)

There are four of the six high score levels with associated player initials that are displayed during the attract mode. This provides a high-score-to-date feature. When players exceed these levels, the player initials may be entered to replace the previous ones. These levels may be adjusted to award credits and to be reset to backup values after a selected number of games.

E Ad 19 Hiscores Allowed - Set to enable or disable the four high score levels; **YES** or **NO**.

E Ad 20 World Record - Adjust the number of credits awarded for exceeding level 1 (the highest of the four levels); 0 to 5.

E Ad 21 Highscore 1 Award- Adjust the number of credits awarded for exceeding level 1; 0 to 3.

E Ad 22 Highscore 2 Award - Adjust the number of credits awarded for exceeding level 2; 0 to 2.

E Ad 23 Highscore 3 Award - Adjust the number of credits awarded for exceeding level 3; 0 to 1.

E Ad 24 Backup World Record - Adjust the score level to which the world record (the highest of the four levels) may be altered. This adjustment is not affected by E Ad30 (Factory Reset defaults to 7,500,000).

E Ad 25 Backup Highscore 1 - Adjust the backup score level to which level 1 may be reset.

E Ad 26 Backup Highscore 2- Adjust the backup score level to which level 2 may be reset.

E Ad 27 Backup Highscore 3- Adjust the backup score level to which level 3 may be reset.

E Ad 28 Backup Highscore 4- Adjust the backup score level to which level 4 may be reset.

E Ad 29 Backup Highscore 5- Adjust the backup score level to which level 5 may be reset.

E Ad 30 High Score Reset Every - Adjust the number of games between automatic resets of high score levels to backup settings and ball time averager adjustments; 100 to 900 or OFF (no reset or adjustment).

E Ad 31 Clean Game Every- Adjust the number of games in which the Clean Game message appears in Tech Alert to indicate the playfield needs cleaning. Adjustable from 100 to 2000.

E Ad 32 Free Play - When set to **YES**, no coins are required for games.

E Ad 33 Custom Message - When desired, this function is used to establish a custom message periodically displayed during the attract mode. Set the feature to **CHANGE** using the Credit button and depress STEP. The letter **A** is indicated in the first position of the Player 1 display. Vary the letter by operating the left and right flippers. With the desired letter indicated, depress the CREDIT button to lock in the letter and advance to the next display character. Repeat this procedure until the desired message is indicated in the Player 1 and 2 displays. At this time, depress the STEP push-button switch to advance to E Ad 34.

E Ad 34 Attract Mode Music - Set to **ON** (approximately every 3 minutes), or **OFF**.

E Ad 35 Flash Lamps- Set to **NORMAL**, **DIM** or **OFF**. When set to **NORMAL** the Flash Lamps are active, when **DIM** the Flash Lamps impulse power is reduced by 25% and when **OFF** the Flash Lamps do not flash.

E Ad 36 Coils Pulse- Set To **NORMAL**, **HARD** or **SOFT**. When **HARD** the coil pulse power is increased by 12.5% of the normal pulse rate. When set to **SOFT** the coil pulse power is reduced by 12.5% of the normal pulse rate. These adjustments are provided to compensate for Low Line or High Line voltage conditions where the solenoids appear to kicking too weak or too hard.

E Ad 37 Level Adjust by - When set to **OPERATOR**, the Manual Percentage Replay Adjustment can only be altered with the front door open (see manual page 3). When set to **ANY**, the Manual Percentage Replay Adjustment will display the message "PRESS START TO CHANGE REPLAY LEVEL" on power up if a change is recommended, and anyone operating the replay button will initiate the change to the replay score.

E Ad 38 Install Country- Set to **USA**, **FRENCH** or **GERMAN**. Determines the default settings for the respective country for game pricing etc.

E Ad 49 Factory Restore-Depressing STEP without changing the value shown in the Player 4 Display locks in any custom message set with E Ad33 and returns the game to GameOver. Set the value to **ON** and depress STEP switch to revert all game adjustments to factory settings, clear the Custom Message and return to Game Over.

GAME SPECIFIC FEATURES (E Ad 39 TO E Ad 48)

E Ad 39 Recall Crystals- Set to **YES** or **NO**. When set to **YES**, all the Crystals a player lites will be retained in memory from Ball to Ball for that Player. When set to **NO**, all of the lit Crystals will be reset at the end of each ball.

E Ad 40 Recall Phasers- Set to **YES** or **NO**. When set to **YES**, all the Phaser spots a player lites will be retained in memory from Ball to Ball for that Player. When set to **NO**, all of the lit Phasers will be reset at the end of each ball.

E Ad 41 Recall Scanner- Set to **YES** or **NO**. When set to **YES**, all the scanner values spotted will be carried from ball to ball for the same player. When set to **NO**, each scanner value spotted must be collected before another value can be spotted.

E Ad 42 Unlimited Million Style-Set to **ON** or **OFF**. When set to **ON**, the feature will increase each successive millions shot by 1,000,000 points. When set to **OFF**, the feature will only award one million points for each shot.

E Ad 43 Unlimited Million Timer- Set to **EXEASY, EASY, FACTORY, HARD** or **EXHARD**. Determines how long the Unlimited Millions feature remains enabled in seconds.

EXEASY	EASY	FACTORY	HARD	EXHARD
25 Seconds	22 Seconds	20 Seconds	17 Seconds	15 Seconds

E Ad 44 Jackpot Timer- Set to **EXEASY, EASY, FACTORY, HARD** or **EXHARD**. Determines how long the Jackpot feature remains enabled in seconds.

EXEASY	EASY	FACTORY	HARD	EXHARD
25 Seconds	20 Seconds	15 Seconds	12 Seconds	10 Seconds

E Ad45 Multiball Timer- Set to **EXEASY, EASY, FACTORY, HARD** or **EXHARD**. Determines how long the Multiball feature remains enabled in seconds.

EXEASY	EASY	FACTORY	HARD	EXHARD
25 Seconds	20 Seconds	15 Seconds	12 Seconds	10 Seconds

E Ad 46 Spot Drop Crystals- Set to **ON** or **OFF**. When set to **ON**, completing either bank of Drop targets, when the game is not in Multiball mode, will light both Drop Target Crystals. When set to **OFF**, each bank of Drop Targets must must be completed to light its respective Crystal.

E Ad 47 Video Mode- Set to **ON** or **OFF**. When set to **ON**, it enables the Video mode, in which the player, at specified times during the game, can shoot at targets on the Dot Matrix Display using the Photon launch button. When set to **OFF**, the Video mode is disabled .

E Ad 48 Hook Promo- Set to **ON** or **OFF**. When set to **ON**, the game, in attract mode will randomly display a short promotion for our next game "HOOK". When set to **OFF**, the game in attract mode will not generate any sounds or graphics refering to HOOK.

GAME DIAGNOSTICS

The Data East Pinball system provides tests for sounds, digital displays, lamps, switches, and solenoids. Each feature may be tested manually or automatically using the STEP and FORWARD/REVERSE push-button switches inside the coin door and the Game Start push-button switch on the front of the cabinet. The automatic tests may be used for a quick verification of automatic test functions and the manual tests, for troubleshooting.

During game play, activation of switches and operation of coils with associated switches are monitored. If a switch is not made for 50 games it is considered bad. When operation of a coil should close or open a switch and does not, the coil is considered bad. In Game over attract mode, bad switches and coils (if any) are reported (See Tech Alert Description below). Note that reporting of an unused switch does not constitute a problem and that a bad coil could mean that the associated switch requires adjustment.

Wiring to switches, solenoids and controlled lamps uses color-coded wires that basically follows a resistor color-code scheme for the eight rows and eight columns. During the switch tests and during the discrete lamp test, identification of the color of the row and column wires are indicated in the Player 3 & 4 Displays. For example, making the right coin switch during the Switch Test results in the switch functional name (RIGHT COIN) shown in the Player 1 and 2 Displays, the row (WHT-YEL) and column (GRN-BRN) wire color codes shown in the Player 3 display, and the switch number shown in the Player 4 display.

BLK = Black
BRN = Brown
RED = Red
ORN = Orange
YEL = Yellow

GRN = Green
BLU = Blue
VIO = Violet
GRY = Grey
WHT = White

ENTERING DIAGNOSTICS

With the game in the game-over mode, open the coin door and make sure that the FORWARD/REVERSE push-button switch is set to REVERSE (down) and depress the STEP push-button switch. The Player displays will show the tollfree Customer Service number 1-800-KICKERS, that is 1-800-542-5377 (U.S. including Illinois) and the toll number (708) 345-7700 (Outside the United States). this indicates entry into game diagnostics.

Service Credits

With the phone number displayed depress the STEP push-button switch. The game now gives the technician the option of adding 1 to 5 service credits. These credits allow the technician to test-play the game without adding any counts to the coin audits (AU 01 & AU 05-AU 08). When the message appears, press and hold the Game Start pushbutton until the desired number of credits are shown on the display. Then press the step button again to add these credits to the game and enter Tech Alert. If no Service Credits are desired, press the step button with the initial message displayed.

Tech Alert

The player displays will now indicate if there are any Bad Switches (Switches that are closed, that should not be or switches that have not been activated in 50 games) it also indicates if the game requires cleaning, based on the number set in E Ad 31.

Burn-In Minutes

Pressing the step button while in Tech Alert mode will step game into Burn-in Mode(Factory use). At this stage pressing the game start button will cause the game to exercise all CPU I/O functions. This is provided to constantly exercise sounds, solenoids, etc...

To stop the test press the start button again. Cumulative Burn-In minutes will be displayed. To reset Burn-In minutes to 00, you must perform a Audit Reset Ad 11 or a Factory Restore E Ad 49.

SOUND TESTS

The Data East Pinball sound system produces true digital stereo sound on left and right speakers and mono on a center speaker. During Sound tests, the bottom display shows the sound board circuit under test and the corresponding sounds are selected by operating the left and right flipper buttons to choose the circuit to be tested. Now press the start button to initiate the sound. Refer to the Sound Test Chart for the sound circuits displayed and the sounds produced.

The sound functions allow verification that all channels are functioning properly and that the speaker connections are correct. Speaker Phase Testing procedures follow for checking speaker connections.

SOUND TEST CHART

Auto/Manual Tests (Player 1 & 2)	Sounds Produced
LEFT SPEAKER CENTER SPEAKER RIGHT SPEAKER VOICE ROM1 (Loc U17) VOICE ROM2 (Loc U21) MUSIC TEST (Sound ROM Loc U7)	Left Sine (Left Speaker Only) Center Sine (All speakers) Right Sine (Right Speaker Only) " She's draining on me...." " I can't hold it together...." Level 1 Through Level 3 Music

Speaker Phase Testing

Connections to each of the three speakers are polarized and each must be connected appropriately for the best quality sound. If one speaker has the positive and negative connections reversed with respect to the other two, bass frequencies will not be produced properly and the overall sound quality will be poor.

To test for proper speaker phasing, use the sound test to cycle through the Left, Center, and Right Sine functions. If the Center Sine produces more volume and bass than the Left and Right Sines, the speakers are connected properly. If it produces the same or less, one speaker is connected improperly. To isolate and correct reversed speaker connections, one of two methods may be used.

1. Check each speaker for polarity markings. If the speakers have polarity markings, verify that the single-color wire (BLK, YEL or RED) is connected to the negative (-) terminal.
2. Disconnect the speaker output connector from the Sound Board and connect a 1.5-volt battery across each speaker pair one at a time while observing the speakers. Make sure that the positive battery terminal is connected to the positive lead (CN1-pin 1, 3, or 6) each time. As the connection is made, check speaker cone movement; proper connections are indicated by outward movement.

DIGITAL DISPLAY TEST

Digital display utilizes an intelligent Dot Matrix Display Board. The purpose behind this board is to provide more information to the operator as well as displaying graphics to the player.

The board is controlled by a Z80A microprocessor and it's personality ROM . (Unique to the Game) . It receives Data, Reset & Clock information from the CPU Board via the ribbon cable and sends back Status and Busy signals to the CPU . This is to insure synchronized communication of both boards.

The Drivers for the rows and columns are provided on 3 surface mounted integrated circuits. U13 & U14 supply the anode power to the columns and U15 supplies the cathode power to the rows.

Automatic Test

To enter Display tests, operate the STEP push-button switch from the Sound Manual test. The displays will first illuminate all dots in the entire Display. After a slight delay it will cycle one column from left to right. After a period of time, it will begin the Row test by lighting the top row of the display, then turning it off and illuminating the next row, until each row has been individually lit, while the other rows are off. The next test begins with every other dot lit, in both the rows and columns. These dots then go out, and the unlit dots light, resulting in an alternating checkerboard pattern. The test concludes with the words "DOT MATRIX LIVES". (Please Note- these tests may be interrupted at any time by operating the STEP push-button switch to advance to the next test.

F/X Motor Test

This Game has an animation feature in the backbox which creates a visual special effect. The motor on this mechanism is controlled by a relay driven by Q26 on the CPU and there are 2 Limit switches (Transporter crew visible, TOP & Transporter crew gone, BOT) used by the CPU to determine the status of the F/X Motor.

After entering this test, press and hold the game's Start Button. This will cause the relay to pulse repeatedly as long as the Button is depressed. At the same time you will notice that both of the switches status (ON & OFF) will be indicated in both the upper and lower portions of the display (Transporter TOP & Transporter BOT.). The appropriate switch should be closed just prior to the limit of the F/X Motor Mechanism and both switches should not be closed (ON) at the same time.

Adjusting the F/X Unit

(For more detailed instructions and the Theory of Operation, see the attached booklet.)

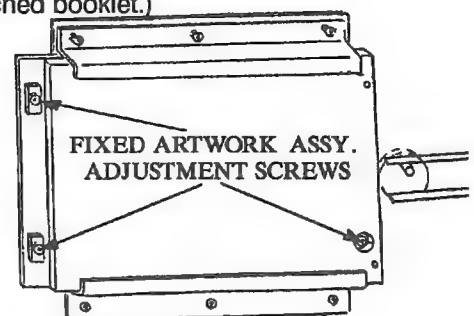
1. Check to make sure the grid plate slides smoothly from side to side. Check this operation with the springs unhooked. There must be no apparent friction of the grid plate as it slides side to side.

2. Place the game into diagnostics, in the Transporter pulse mode. Using the start button, pulse the motor until the cam pin actuates the top switch (watch display). This actuation should occur within the top 15 degrees of rotation.

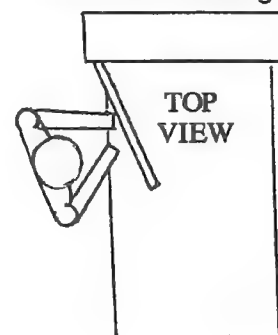
3. Loosen the 3 screws that fasten the fixed artwork assembly , adjust the assembly so that a complete, sharp image of the Transport Team is visible. Tighten screws.

4. Cycle the motor 1/2 turn. The Transport Team will disappear. At this point, set the bottom switch actuator to *just* make the switch.

5. Cycle the motor until the top switch closes (watch display). The Transport Team should reappear. Cycle the motor again until the bottom switch closes (watch display). The transport team should completely disappear. Cycle the motor a few more times to verify the accuracy of the switch settings.



Note: When making adjustments always view the unit straight on, never at an angle.



Switches

Switches are configured in an 8 x 8 matrix of columns (switch drives) and rows (switch returns) with up to 64 switches possible. The switch tests include three parts; switch test, active switches, and bad switches. Row and column wire colors are indicated in each test using corresponding resistor color code numbers.

Switch Test

From the Display Manual test, operate STEP push-button switch. Player 1 and 2 displays indicate SWITCH TEST. Close each switch and observe the displays. The Player 1 and 2 displays will indicate the switch name, the Player 3 display indicates the row and column wire colors, and the Player 4 display indicates the switch number. When a switch is released, the name and number disappear until another switch is closed or the test is exited.

Active Switches

Operate the STEP push-button switch from the Switch Test. Player 1 and 2 Displays indicate ACTIVE SWITCHES. If any switches are stuck closed (or made from the presence of a ball), the Player 1 and 2 displays sequence through switch names, the Player 3 display indicates the row and column wire colors, and the switch numbers are indicated in the Player 4 display. This cycle continues until all switches are cleared or until the STEP push-button switch is depressed.

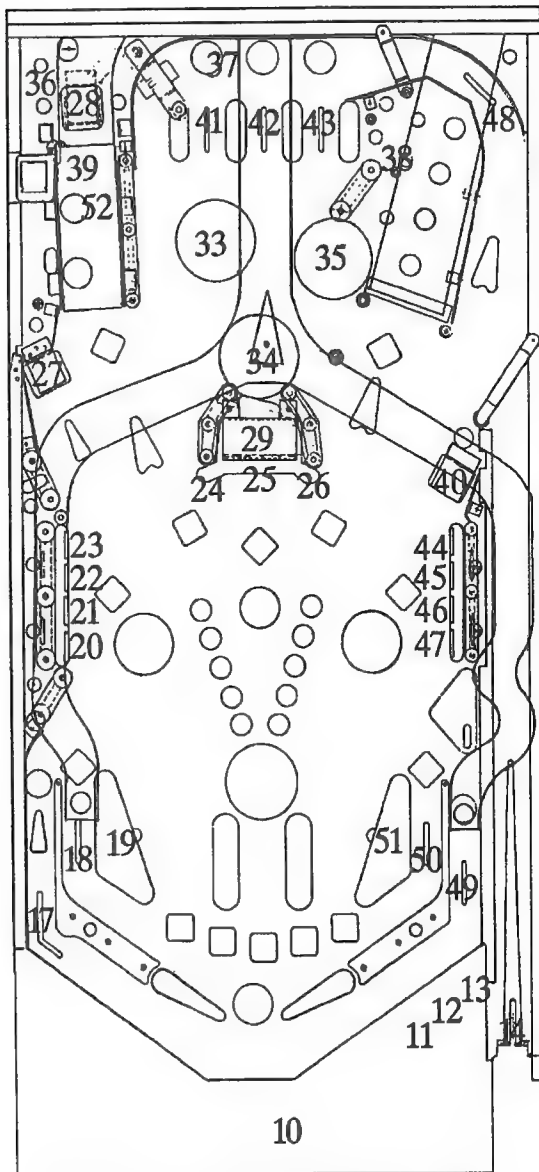
SWITCH MATRIX CHART

COLUMN ROW	1 Q55 GRN-BRN CN8-1	2 Q54 GRN-RED CN8-2	3 Q53 GRN-ORN CN8-3	4 Q52 GRN-YEL CN8-4	5 Q51 GRN-BLK CN8-5	6 Q50 GRN-BLU CN8-7	7 Q49 GRN-VIO CN8-8	8 Q48 GRN-GRY CN8-9
1 WHT-BRN CN10-9	Plumb Tilt 1	Not Used 9	Left Outlane 17	Moving Target 25	Left Turbo Bumper 33	Left Top Lane 41	Right Outlane 49	Not Used 57
2 WHT-RED CN10-8	Not Used 2	Outhole 10	Left Return 18	Right Standup Tgt. 26	Center Turbo Bumper 34	Center Top Lane 42	Right Return 50	Not Used 58
3 WHT-ORN CN10-7	Credit Button 3	Trough #1 Left 11	Left Slingshot 19	Lower Left Hole 27	Right Turbo Bumper 35	Right Top Lane 43	Right Slingshot 51	Not Used 59
4 WHT-YEL CN10-6	Right Coin 4	Trough #2 Center 12	Left Drop Tar. 1 Bot. 20	Upper Left Hole Top 28	Enter Left Ramp 36	Right Drop Tar. 1 Top 44	Upper Left Hole Bottom 52	Not Used 60
5 WHT-GRN CN10-5	Center Coin 5	Trough #3 Right 13	Left Drop Tar. 2 21	Moving Target Hole 29	Exit Center Ramp 37	Right Drop Tar. 2 45	Not Used 53	Not Used 61
6 WHT-BLU CN10-3	Left Coin 6	Shooter Lane 14	Left Drop Tar. 3 22	Ball Launch Button 30	Enter Right Ramp 38	Right Drop Tar. 3 46	Not Used 54	Not Used 62
7 WHT-VIO CN10-2	Slam Tilt 7	Left EOS 15	Left Drop Tar. 4 Top 23	Transp. Crew Visible 31	Up/Down Ramp Up 39	Right Drop Tar. 4 Bot. 47	Not Used 55	Not Used 63
8 WHT-GRY CN10-1	Not Used 8	Right EOS 16	Left Standup Tgt. 24	Transp. Crew Gone 32	VUK 40	Top Right Rollover 48	Not Used 56	Not Used 64

Star Trek- Switch Part Numbers

Number	Description	Part No.	Number	Description	Part No.
01*	Plumb Tilt	See Cabinet	10	Out Hole	180-5011-00
02	Not Used	-	11	Trough #1 (Left)	180-5009-00
03*	Credit Button	500-5097-02	12	Trough #2 (Center)	180-5009-00
04*	Right Coin	180-5024-00	13	Trough #3 (Right)	180-5010-00
05*	Center Coin	180-5024-00	14	Shooter Lane	180-5053-00
06*	Left Coin	180-5024-00	15*	Left Flip. Cab. Switch	180-5067-00
07*	Slam Tilt	180-5022-00	16*	Right Flip. Cab. Switch	180-5067-00
08	Not Used	-	17	Left Outlane	500-5142-00
09	Not Used	-	18	Left Return Lane	500-5142-00
			19	Left Slingshot Sw. (2)	180-5054-00
			20	Left Drop Target 1 Bottom	180-5092-00
			21	Left Drop Target 2	180-5092-00
			22	Left Drop Target 3	180-5092-00
			23	Left Drop Target 4 Top	180-5092-00
			24	Left Stand-Up Target	500-5336-08
			25	Moving Target	180-5081-08
			26	Right Stand-Up Target	500-5336-08
			27	Lower Left Hole	180-5057-00
			28	Upper Left Hole Top	180-5057-00
			29	Moving Target Hole	180-5057-00
			30 *	Ball Launch Button	500-5410-02
			31	Transport Crew Visable	180-5094-00
			32	Transport Crew Gone	180-5094-00
			33	Left Turbo Bumper	180-5015-00
			34	Center Turbo Bumper	180-5015-00
			35	Right Turbo Bumper	180-5015-00
			36	Enter Left Ramp	500-5382-00
			37	Exit Center Ramp	500-5382-00
			38	Enter Right Ramp	500-5382-00
			39	Up/Down Ramp - Up	180-5010-00
			40	VUK	180-5064-00
			41	Left Top Lane	515-5138-00
			42	Center Top Lane	515-5138-00
			43	Right Top Lane	515-5138-00
			44	Right Drop Target 1 Top	180-5092-00
			45	Right Drop Target 2	180-5092-00
			46	Right Drop Target 3	180-5092-00
			47	Right Drop Target 4 Bottom	180-5092-00
			48	Top Right Rollover	515-5138-00
			49	Right Outlane	500-5142-00
			50	Right Return Lane	500-5142-00
			51	Right Slingshot Sw. (2)	180-5054-00
			52	Upper Left Hole Bottom	180-5057-00
			53	Not Used Through 64	

* Indicates Cabinet Switches



Switch Locations

LAMP TESTS

Controlled lamps are configured in an 8 x 8 matrix of columns (lamp drives) and rows (lamp returns) with up to 64 lamps possible. The lamp tests include four parts, all lamps, lamp return (row), lamp drive (column), and discrete (individual) lamps. Row and column wire colors are indicated in the discrete lamp test using corresponding resistor color code numbers.

All Lamps

From the Active Switch test, operate the STEP push-button switch. Player 1 and 2 displays indicate ALL LAMPS and all controlled lamps will light.

Lamp Returns

From the ALL LAMPS test, depress the STEP push-button switch. The top display indicates LAMP RETURNS and the Bottom display indicates wire color and the LAMP RETURN driver transistor. All controlled lamps in row 1 should be lit. Operating the Game Start push-button switch cycles through each of the rows separately.

Lamp Drives

From the LAMP RETURNS test, depress the STEP push-button switch. The Top display indicates LAMP COLUMNS and the bottom display indicates wire color and the LAMP DRIVES driver transistor. All controlled lamps in column 1 should be lit. Operating the Game Start push-button switch, cycles through each of the columns separately.

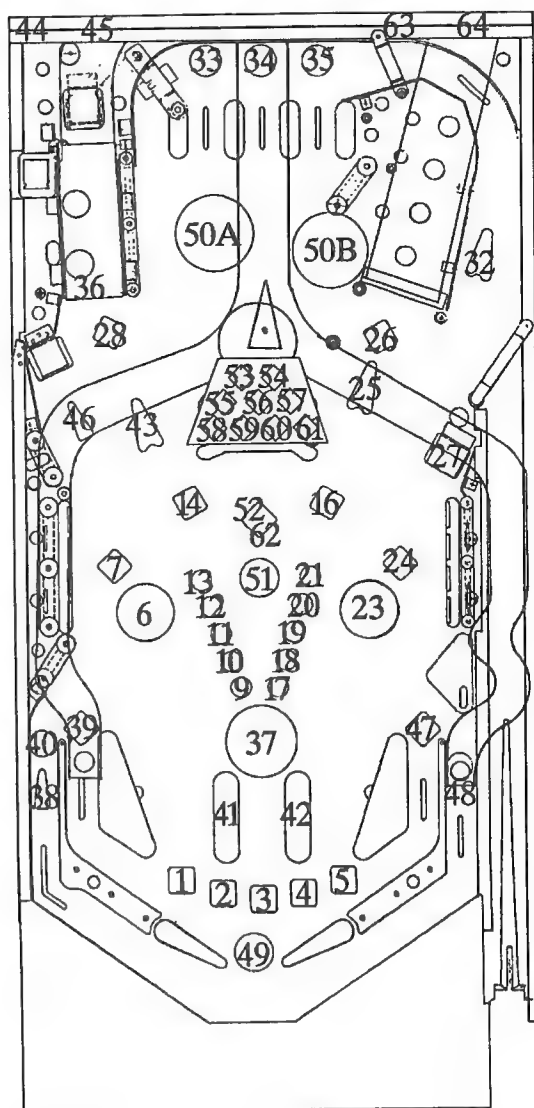
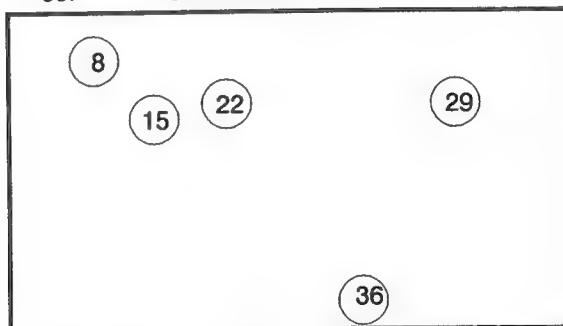
Single Lamp

From the LAMP DRIVES test, depress the STEP push-button switch. The top display indicates lamp name. The bottom display indicates the row and column wire colors and the lamp matrix number. Lamp 01 should light. With the FORWARD/REVERSE push-button switch in the FORWARD (up) position, operating the Game Start push-button switch selects higher-numbered lamps; with it in the REVERSE (down) position, Game Start selects lower-numbered lamps.

LAMP MATRIX CHART

COLUMN ROW	1 Q71 YEL-BRN CN7-1	2 Q70 YEL-RED CN7-2	3 Q69 YEL-ORN CN7-3	4 Q68 YEL-BLK CN7-4	5 Q67 YEL-GRN CN7-6	6 Q66 YEL-BLU CN7-7	7 Q65 YEL-VIO CN7-8	8 Q64 YEL-GRY CN7-9
1 Q72 RED-BRN CN6-1	2X 1	Left Phaser #1 9	Right Phaser #1 17	Extra Ball Arrow 25	Left Toplane 33	Ship's Left Engine 41	Shoot Again 49	Crystal Bank #5 57
2 Q73 RED-BLK CN6-2	4X 2	Left Phaser #2 10	Right Phaser #2 18	Playfld. Crystal #2 26	Center Toplane 34	Ship's Right Engine 42	L.&R. Turbo Bumper 50	Crystal Bank #6 58
3 Q74 RED-ORN CN6-3	6X 3	Left Phaser #3 11	Right Phaser #3 19	Right Scoop 27	Right Toplane 35	Jackpot Arrow 43	Unlimited Millions 51	Crystal Bank #7 59
4 Q75 RED-YEL CN6-5	8X 4	Left Phaser #4 12	Right Phaser #4 20	Playfld. Crystal #1 28	Backbox #5 36	Left Ramp Red 44	Playfld. Crystal #4 L. 52	Crystal Bank #8 60
5 Q76 RED-GRN CN6-6	10X 5	Left Phaser #5 13	Right Phaser #5 21	Backbox #4 29	Ship's Body 37	Left Million Green 45	Crystal Bank #1 53	Crystal Bank #9 61
6 Q77 RED-BLU CN6-7	Ice Planet X-Ball 6	Playfld. Crystal #3 14	Backbox #3 22	Ball Launch Button 30	Laser Kick 38	Lite Scanner Arrow 46	Crystal Bank #2 54	Playfld. Crystal #4 R. 62
7 Q78 RED-VIO CN6-8	Playfld. Crystal #7 7	Backbox #2 15	Ice Planet 10 Mil. 23	Cab.-Start Button 31	Playfld. Crystal #6 39	Playfld. Crystal #9 47	Crystal Bank #3 55	Right Million Green 63
8 Q79 RED-GRY CN6-9	Backbox #1 8	Playfld. Crystal #5 16	Playfld. Crystal #8 24	Re-lite Laser Kick 32	Left Shields On 40	Right Shields On 48	Crystal Bank #4 56	Right Ramp Red 64

Lamp Number	Description
01.	2X
02.	4X
03.	6X
04.	8X
05.	10X
06.	Ice Planet Extra Ball
07.	Playfield Crystal #7
08.*	Backbox #1
09.	Left Phaser #1



Lamp Locations

10. Left Phaser #2
11. Left Phaser #3
12. Left Phaser #4
13. Left Phaser #5
14. Playfield Crystal #3
- 15.* Backbox #2
16. Playfield Crystal #5
17. Right Phaser #1
18. Right Phaser #2
19. Right Phaser #3
20. Right Phaser #4
21. Right Phaser #5
- 22.* Backbox #3
23. Ice Planet 10 Million
24. Playfield Crystal #8
25. Extra Ball Arrow
26. Playfield Crystal #2
27. Right Scoop
28. Playfield Crystal #1
- 29.* Backbox #4
30. Ball Launch Button
31. Cabinet Start Button
32. Re-Lite Laser Kick
33. Left Top Lane
34. Center Top Lane
35. Right Top Lane
- 36.* Backbox #5
37. Ships Body
38. Laser Kick
39. Playfield Crystal #6
40. Left Shields On
41. Ships Left Engine
42. Ships Right Engine
43. Jackpot Arrow
44. Left Ramp Red
45. Left Million Green
46. Lite Scanner Arrow
47. Playfield Crystal #9
48. Right Shields On
49. Shoot Again
50. Left & Right Turbo Bumper
51. Unlimited Millions
52. Playfield Crystal #4 Left
53. Crystal Bank #1
54. Crystal Bank #2
55. Crystal Bank #3
56. Crystal Bank #4
57. Crystal Bank #5
58. Crystal Bank #6
59. Crystal Bank #7
60. Crystal Bank #8
61. Crystal Bank #9
62. Playfield Crystal #4 Right
63. Right Million Green
64. Right Ramp Red

* Indicates Insert Panel or Backpanel Lamps

FLASH LAMP COIL TESTS

Twenty-Two regular (pulsed under microprocessor control) coil drivers are provided to switch ground to coils. The Left/Right relay is used in conjunction with drives 1 through 8 to switch +32 volts between coils or flash lamps; these sets are termed "left" and "right". This relay is located on the PPB board which provides isolation diodes and current limiting resistors. This effectively provides 29 regular coils.

Flash Lamp

From the Single Lamp test, depress the STEP push-button switch. All Flash lamps will fire randomly. This allows the Technician to easily spot any burned out bulbs and replace them without stepping through the tests below.

Automatic Test

From the Flash Lamps test, depress the STEP push-button switch. Player 1 and 2 displays indicate ALL COILS. The test pulses each regular solenoid or flash lamp sequentially with the coil/flash lamp name indicated in the Player 1 and 2 displays and the wire colors in the Player 3 and 4 displays.

Select Coil

From the Coil Test, depress the STEP push-button switch. Player 1 and 2 displays indicate SELECT COIL and then the name of 1st drive, the wire colors are indicated in the Player 3 and 4 displays. Operate either Flipper push-button switch to select the coil or flash lamp to be tested. With the desired drive number indicated in the Player 4 display, depress the START push-button switch to cause it to be pulsed repeatedly.

RETURN TO GAME OVER

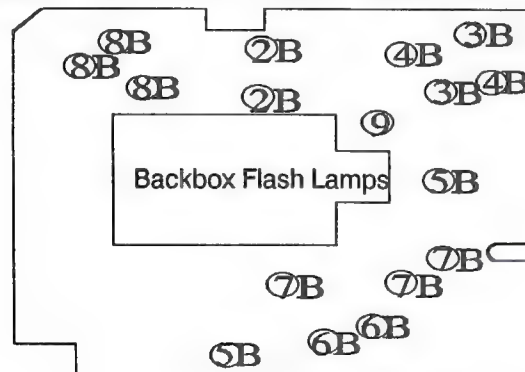
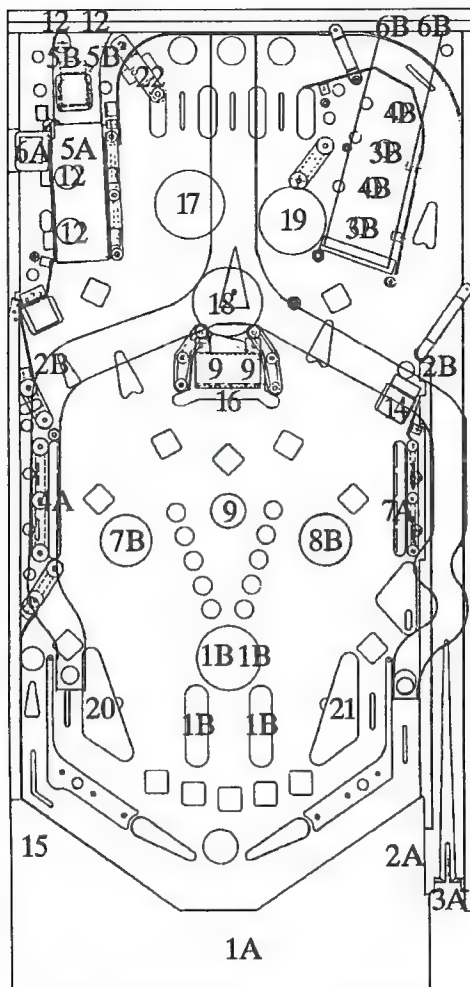
From the Select Coil test, depress the STEP push-button switch once. The game returns to the game-over mode.

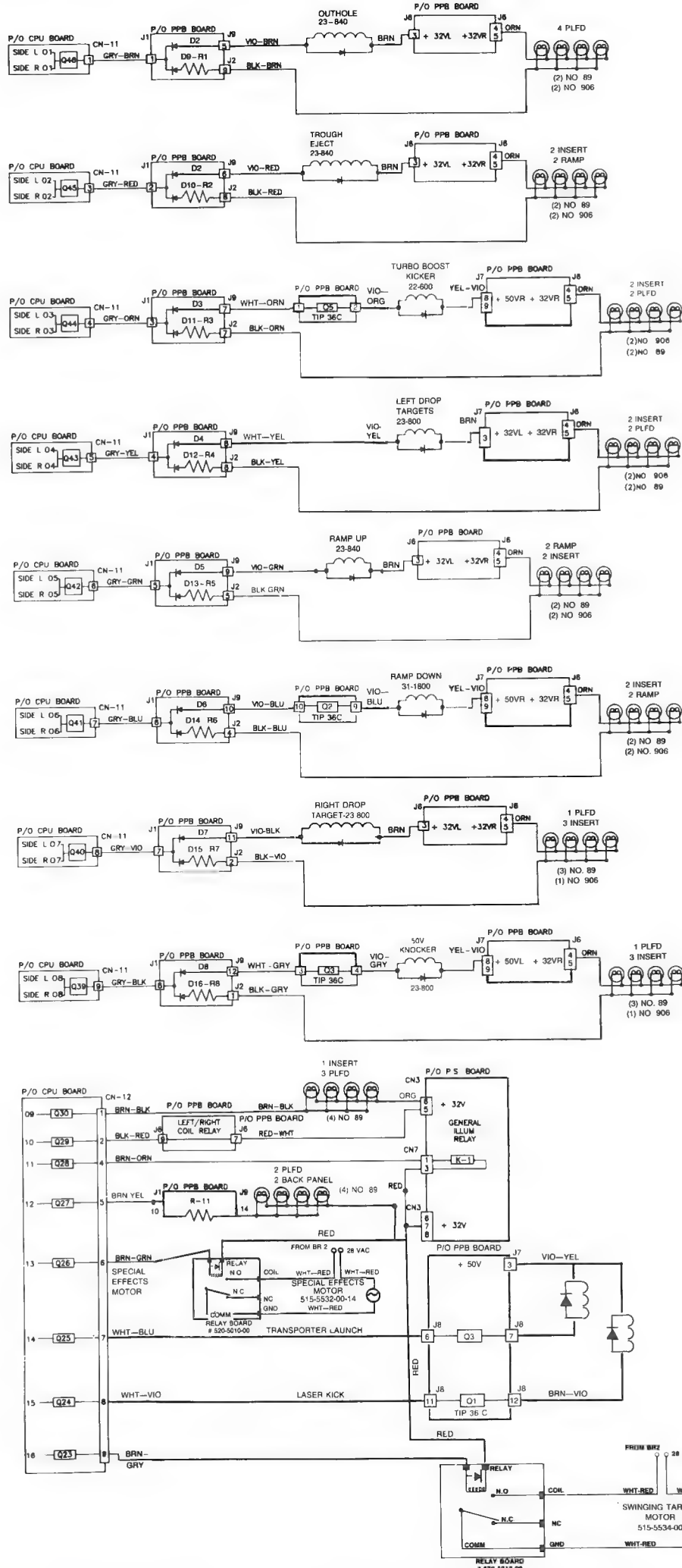
CPU Controlled Auxillary Solenoids

Coil Number	Coil Description	Control Line (CPU to Coil)	Power Line (PS to Coil)	Drive Transistor	Coil Type
17	Left Turbo Bumper	BLU-ORN CPU CN19-3	RED PS CN3-6	Q8	23-800
18	Center Turbo Bumper	BLU-RED CPU CN19-4	RED PS CN3-6	Q9	23-800
19	Right Turbo Bumper	BLU-YEL CPU CN19-6	RED PS CN3-6	Q10	23-800
20	Left Slingshot	BLU-BRN CPU CN19-7	RED PS CN3-6	Q11	23-800
21	Right Slingshot	BLU-GRN CPU CN19-8	RED PS CN3-6	Q12	23-800
22	Gate(See Schematic)	BLU-BLK CPU CN19-9	RED PS CN3-6	Q13	31-1800

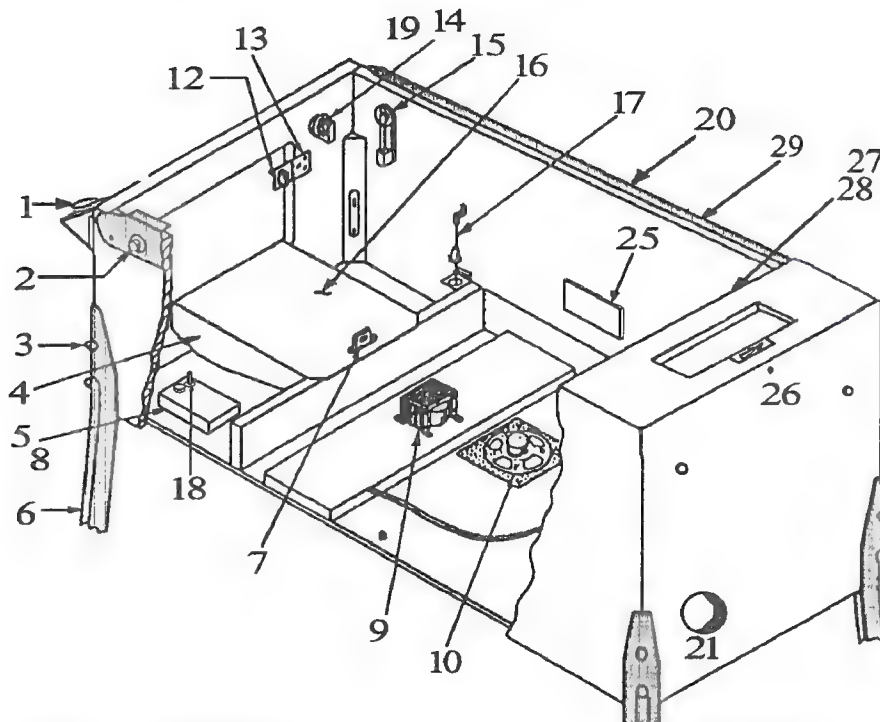
Flipper Solenoids

Coil Description	Flipper GND CPU to Coil	Sw. to Flip.PCB CN1-9 CN1-1	Power Lines FlipPc toCoil CN2-1,2 CN1-1	Coil Type	Power Input To Flip PCB 50VDC GRY, GRY-GRN 8VAC
Left Flipper 090-5030-00	ORN-GRY CPU CN19-2	BLU-GRY CN1-9	GRY-YEL CN2-1,2	23-1100	BLK-WHT 50VDC
Right Flipper 090-5030-00	ORN-VIO CPU CN19-1	BLU-VIO CN1-1	BLK-WHT CN1-1	23-1100	GRY, GRY-GRN 8VAC



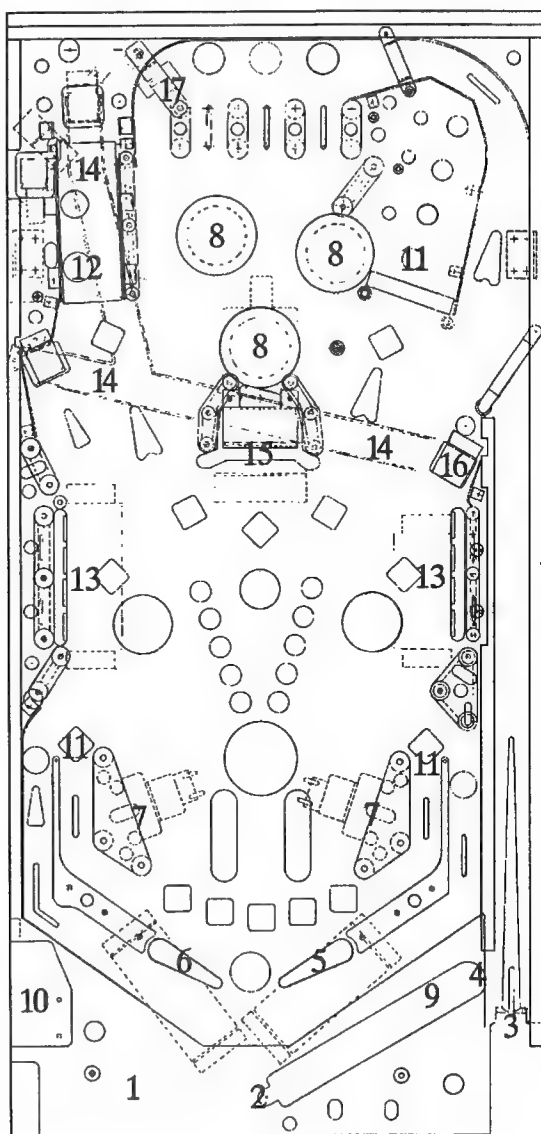


CABINET PARTS ILLUSTRATION



Item	Description	Part No.
1	Ball Launch Button	515-5472-00-14
2	Flipper Button	500-5026-16
3	Leg Bolt (Black)	231-5000-01
4	Cash Box Bottom	545-5090-00
5	On/Off Switch DP/ST	180-5001-00
6	Leg (Black)	535-5020-30
7	Lock Bracket-Cash Box	535-5215-00
8	Power Input Box Assy	515-5360-00-10
9	Transformer	010-5003-00
10	Speaker-Round (6")	031-5000-00
11	Side Armor-Right(Not Shown)	535-5010-31
12	Memory Protect Switch	180-5000-00
13	Memory Protect Switch Bracket	535-5225-01
14	Start Switch Assembly	500-5487-06
15	Flipper Leaf Switch	180-5048-01
16	Cash Box Top	535-5013-01
17	Plumb Bob Tilt Assembly	500-5023-00
18	Volume Control	123-5000-00
19	Playfield Glass (Tempered)	660-5001-00
20	Side Armor -Left	535-5010-32
21	Recessed cup for Line cord	545-5122-00
22	Service Switch (Not Shown)	180-5012-00
23	Front Molding Lockdown Assy.	500-5020-00
24	Front Molding -Black (Not Shown)	500-5021-10
25	S.S.Flipper P.C.B.	520-5033-00
26	Roto Lock Bottom	355-5006-01
27	Rear Plastic Extrusion for Playfield Glass	545-5038-00
28	Mounting Foam for Extrusion	626-5004-00
29	Plastic Channel (Right & Left)	545-5017-00

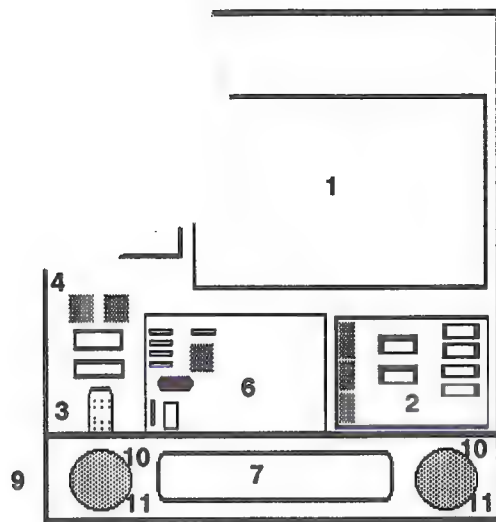
Playfield - Major Assemblies



Item	Description	Part Number
1.	Bottom Arch	545-5231-04
2.	Outhole Kicker	500-5082-00
3.	Turbo Kicker	500-5406-00
4.	Ball Trough Eject	500-5012-01
5.	Flipper Assy. Right	500-5177-71
6.	Flipper Assy. Left	500-5177-72
7.	Sling Shot Assy.	500-5226-00
8.	Turbo Bumper Assy.	500-5227-00
9.	Ball Trough	500-5044-00
10.	Kick Back Assy.	500-5080-00
11.	Plastic Ramp Assy.	500-5377-00-14
12.	Up/Down Ramp parts	See Page 34
13.	Drop Target 4 Bank	500-5437-02
14.	Under Chute Assy.	500-5400-00
15.	Moving Target Assy.	500-5370-00
16.	Super VUK	500-5116-05
17.	Gate Lift Coil Plate Assy.	515-5465-00

Individual part breakdowns for most of these assemblies can be found on pages 34 through 41 and 63 64 & 65.

BACKBOX PARTS ILLUSTRATION



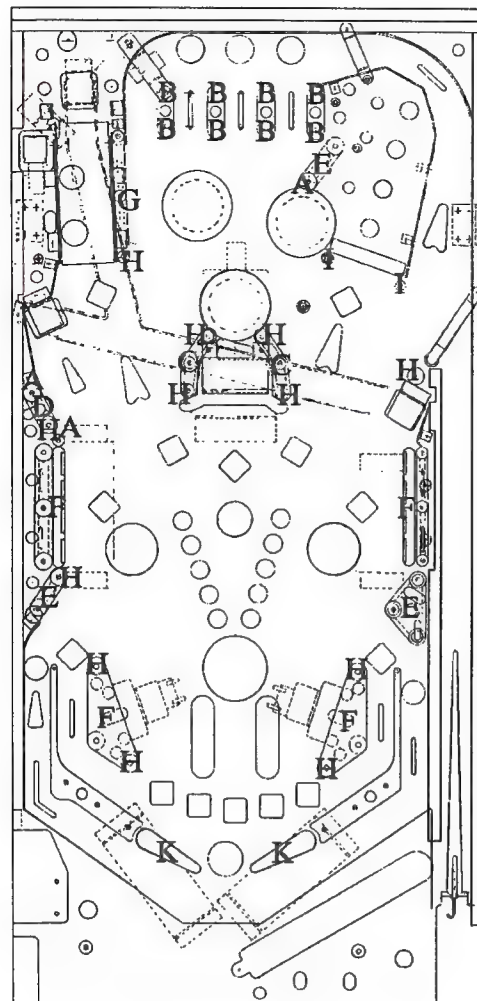
Item	Description	Part No.
1	CPU Board Assy.(Non-Reflex)	520-5003-03 †
2	Sound Board Assy	520-5050-01†
3	Capacitor 2C1	125-5000-00
4	Bridge Rectifiers	112-5000-00
5	Power Supply Bd. Assy	520-5047-00
6	PPB Board	520-5021-05
7	Dot Matrix Display Bd	520-5042-00 †
8	Display Ribbon Cable*	036-5000-24-10
9	Speaker Housing	515-5416-00
10	Speakers (2)	031-5004-00
11	Speaker Grill (2)	830-5612-00
12	Back Box Glass (Clear)*	660-5000-00
13	Roto-Lock Top*	355-5006-02
14	Backglass Artwork*	830-5214-01
15	Chaser Light PCB.*	520-5054-00

* Not Shown

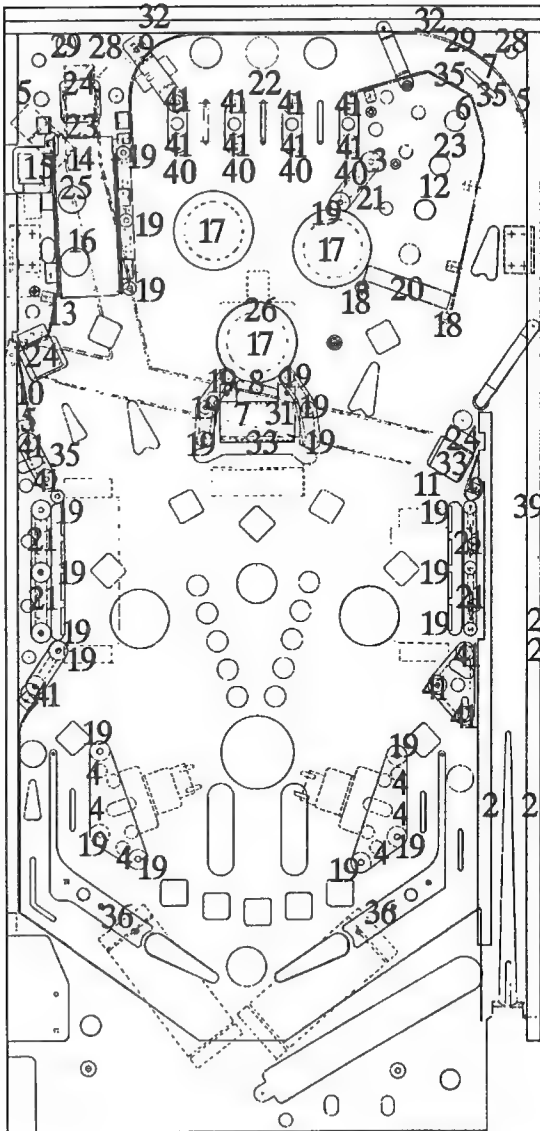
† When ordering PC Boards with ROMs
please specify game name

RUBBER PARTS ILLUSTRATION

Item	Description	Part #
A.	3/16" (3)	545-5025-01
B.	5/16" (8)	545-5025-02
C.	1" (2)	545-5025-05
D.	1 1/4" (1)	545-5025-06
E.	1 1/2" (3)	545-5025-07
F.	2 1/2" (4)	545-5025-09
G.	3" (1)	545-5025-10
H.	Rubber Post -Short (13)	545-5151-00
I.	Rubber Post -Long(2)	545-5260-00
J.	Shooter Tip	545-5276-00
K.	Flipper (2)	545-5277-00



Playfield Parts



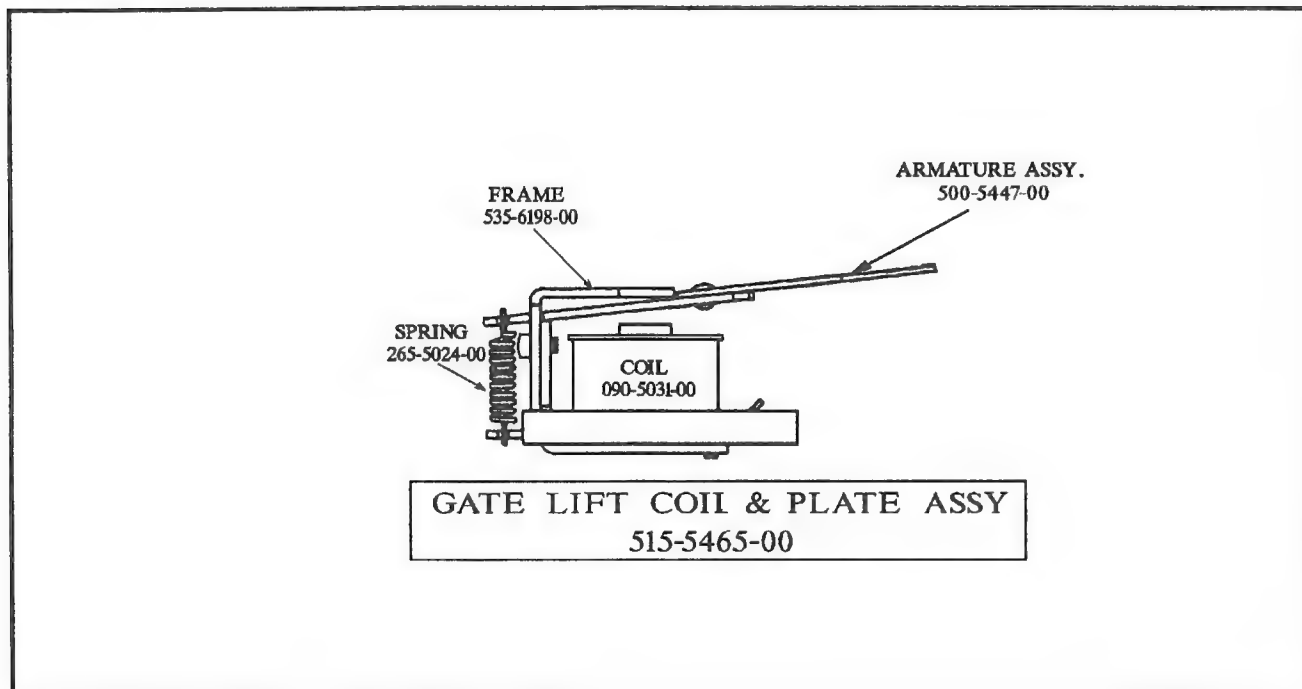
No. Description

Part Number

1. Chase Lights*	165-5009-01
2. Plastic Spacer (4)	254-5000-02
3. 5/8" Hex Spacer (2)	254-5008-02
4. 4 1/2" Hex Spacer (3)	254-5008-03
5. 1 1/2" Hex Spacer (3)	254-5008-09
6. Ball Guide Assy.	500-5288-00
7. Ball Guide Assy.	500-5290-00
8. Crystal Sign	500-5379-00-14
9. Ball Guide Assy.	500-5380-00
10. Ball Guide Assy.	500-5383-00
11. Stand Up Sign	500-5393-00-14
12. Screened Plastic Set	830-5427-XX
13. Ball Guide	500-5405-00
14. Ball Guide	515-5431-00
15. Pivot Side Plate	515-5459-00-14
16. Mtg. Brkt. Transporter	535-6120-00
17. Turbo Bumper Caps (3)	545-5225-01
18. Bumper Post (2)	530-5007-00
19. Metal Standoff (23)	530-5035-01
20. Spring Plate	535-5022-00
21. Wire From 1" (5)	535-5300-05
22. Wire Gate	535-5625-00
23. Wire Gate	535-5960-02
24. Ball Deflector	535-5308-01
25. Wire Form	535-5642-00
26. Diverter	535-5917-00
27. Ball Deflector	535-6101-00
28. Light Cover Red	545-5014-02
29. Light Cover Green	545-5014-04
30. Light Cover Yellow	545-5014-06
31. Crystal Insert	545-5274-00
32. Mirror Back Panel	545-5275-00
33. SB Mini Mars Red	550-5031-02
34. SB Mini Mars Yellow	550-5031-06
35. SB Mini Mars Blue	550-5031-05
36. Return Lane Guides	550-5037-01
37. Decal Sheet*	820-5061-XX
38. P/F Mylar*	820-5819-00
39. Screened Plastics*	830-5427-XX
40. Plastic Hood (4)	545-5012-01
41. Plastic Post (14)	545-5013-01

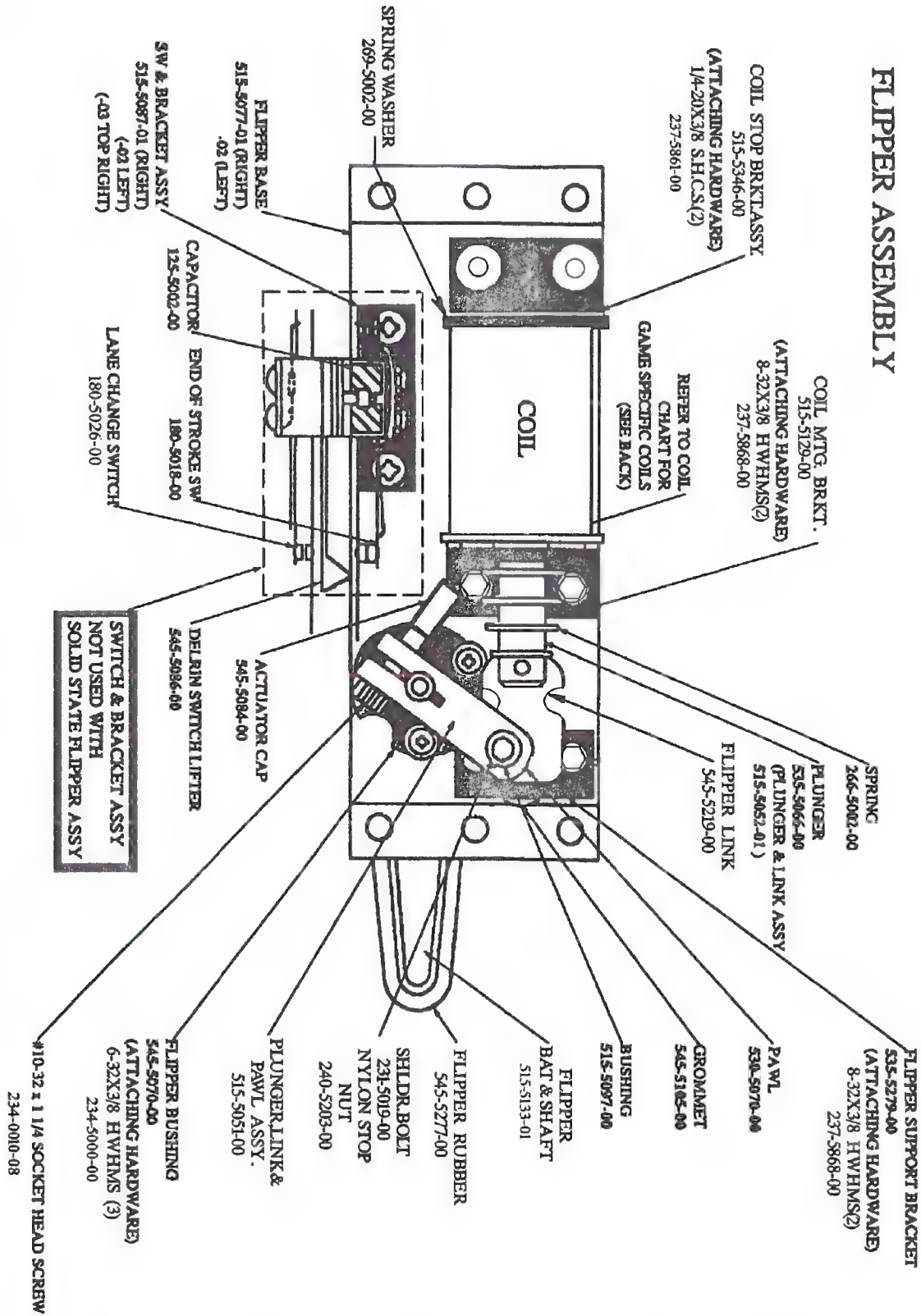
Note:
See page 25 for switch part numbers

* Indicates not shown



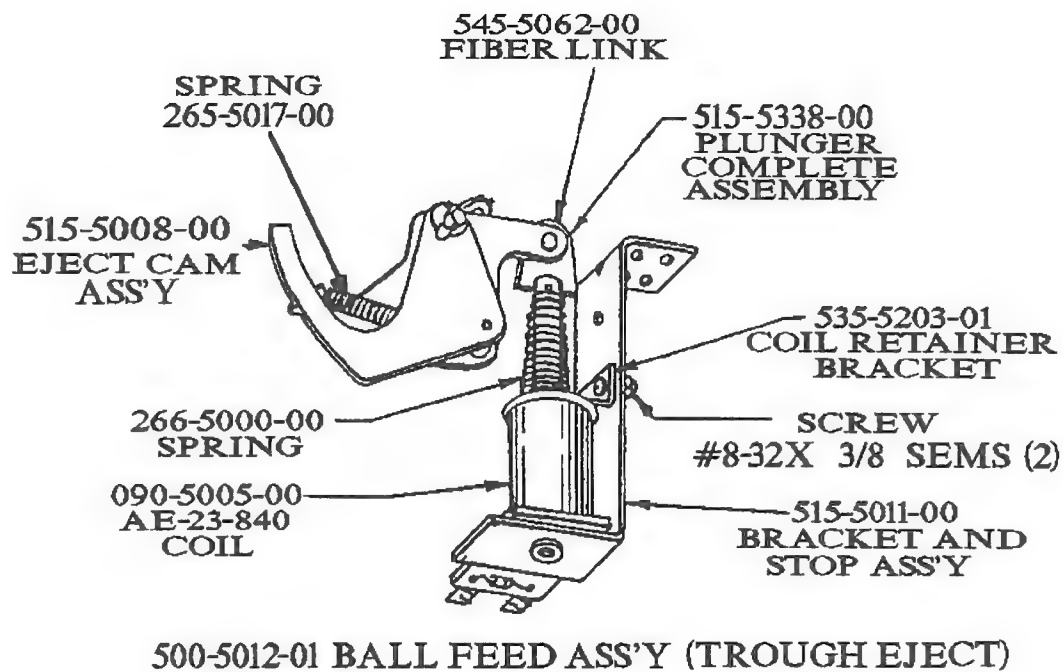
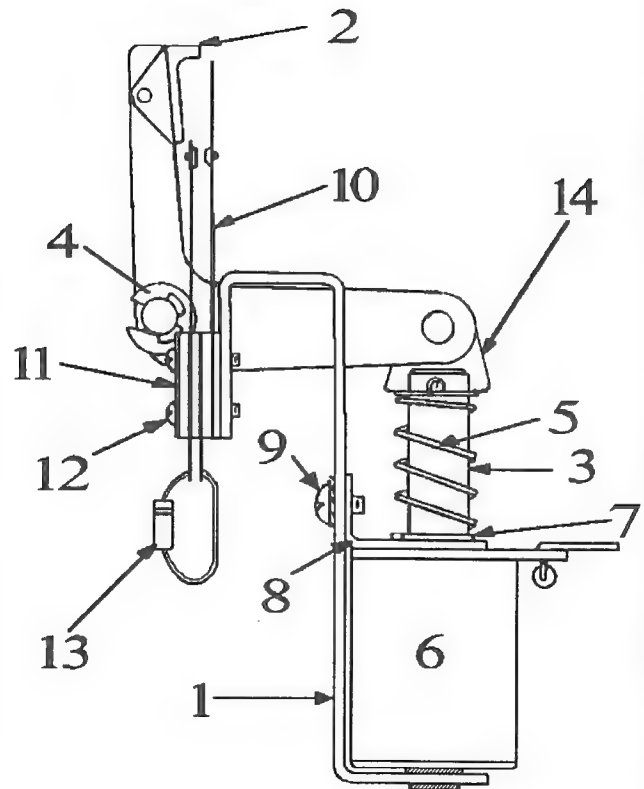
	Item	Part #	Description
<p>500-5116-05 Super VUK</p>	1	545-5193-00	Sw. Insulator
	2	180-5064-00	Micro Switch
	3	266-5025-00	Cap Spring
	4	535-5298-00	Ball Kickup Mtg. Brkt
	5	535-6047-00	Ball Guide Brkt.
	6	535-6143-00	Ramp Guide Brkt.
	7	545-5227-00	Vert. Kick. Cap
	8	535-5111-00	Pin $\frac{3}{32} \times \frac{7}{16}$
	9	535-5203-01	Coil Retainer Brkt. (2)
	10	090-5001-00	Coil 23-800
	11	112-5003-00	1N4004 Diode
	12	237-5806-00	2-56x $\frac{1}{2}$ Screw (2)
	13	232-5200-00	#6-32x $\frac{1}{4}$ Phil. M.S.
	14	266-5009-00	Spring
	15	515-5352-00	Plunger Assy.
	16	280-5003-00	Bumper
	17	270-5010-00	Compression Ring (3)
	18	232-5200-00	#6-32 X $\frac{1}{4}$ SEMS

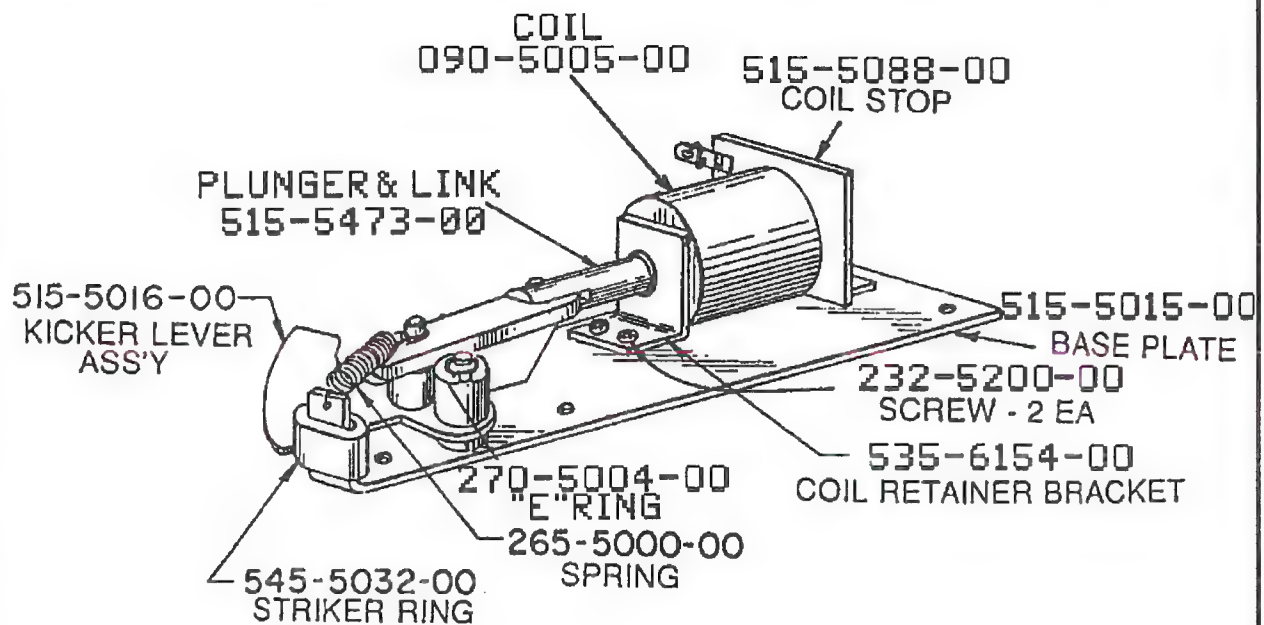
FLIPPER ASSEMBLY



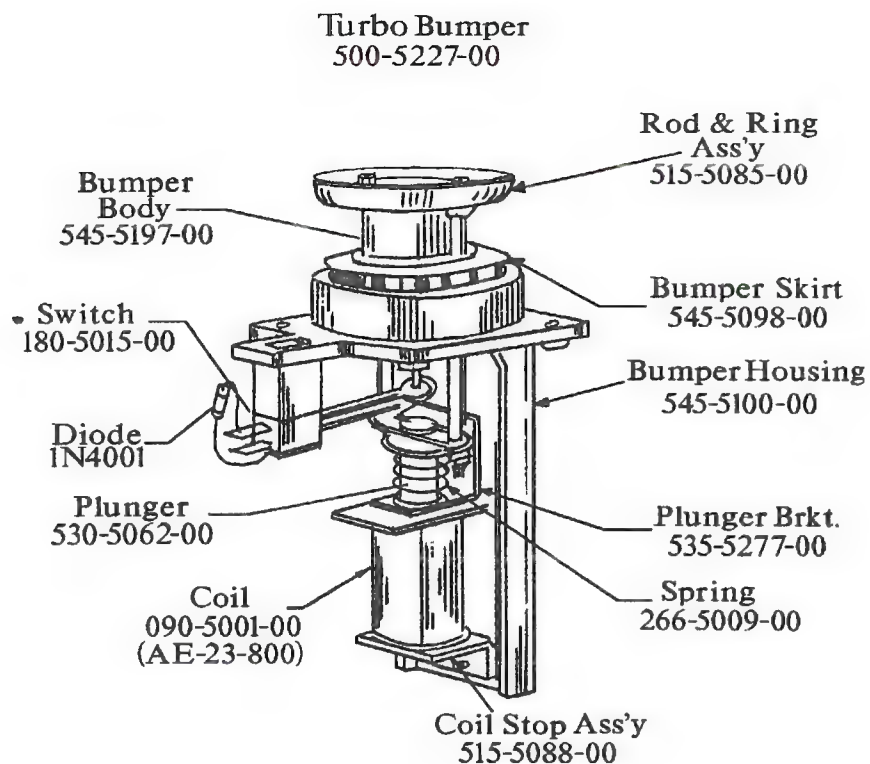
Slingshot Assembly 500-5226-00

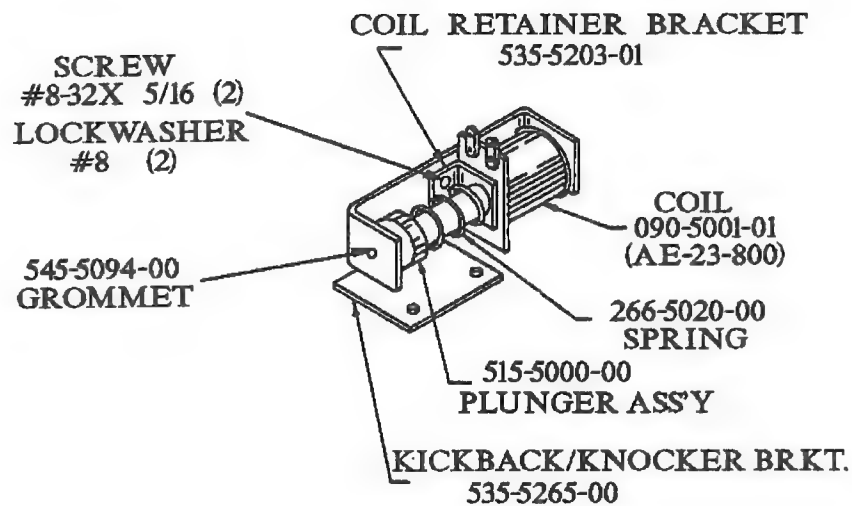
Item	Description	Part No.
1	Slingshot Bracket	515-5339-00
2	S.S. Arm & Tip Assy.	515-5340-00
3	Plunger & Link Assy.	515-5338-00
4	1/4 Retaining Ring (2)	270-5002-00
5	Spring	266-5020-00
6	23-800 Coil	090-5001-02
7	Coil Sleeve	260-0004-00
8	Coil Retainer	535-5203-01
9	#8-32 X 1/4" Screw (2)	232-5300-00
10	Slingshot Switch (2)	180-5054-00
11	Tension Plate (2)	535-5846-00
12	#4-40 X 1/2" Screw (4)	237-5837-00
13	Diode 1N4004 (2)	112-5004-00
14	Link, Plunger	545-5062-00



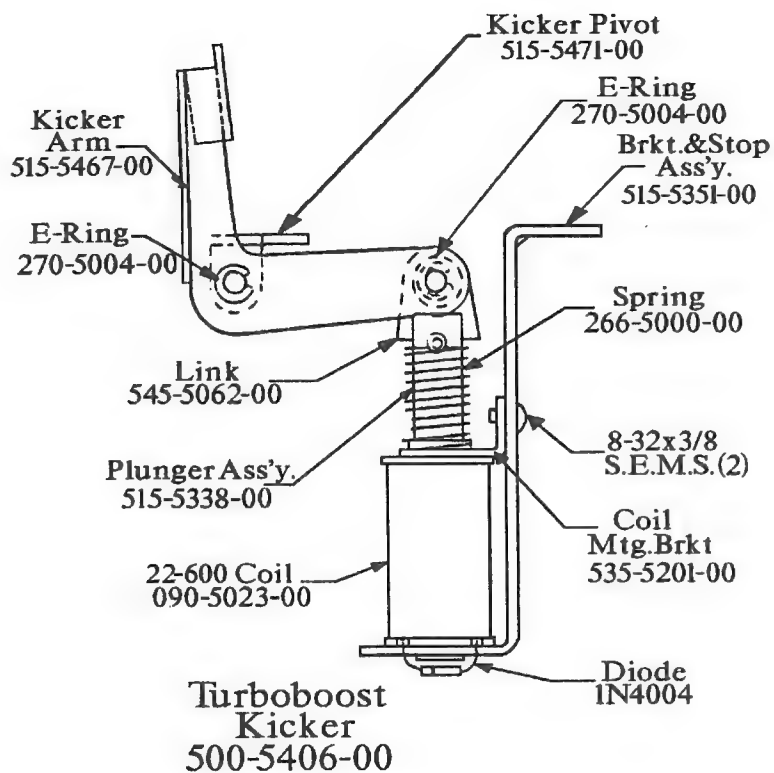


500-5082-00 OUTHOLE BALL RETURN ASSY

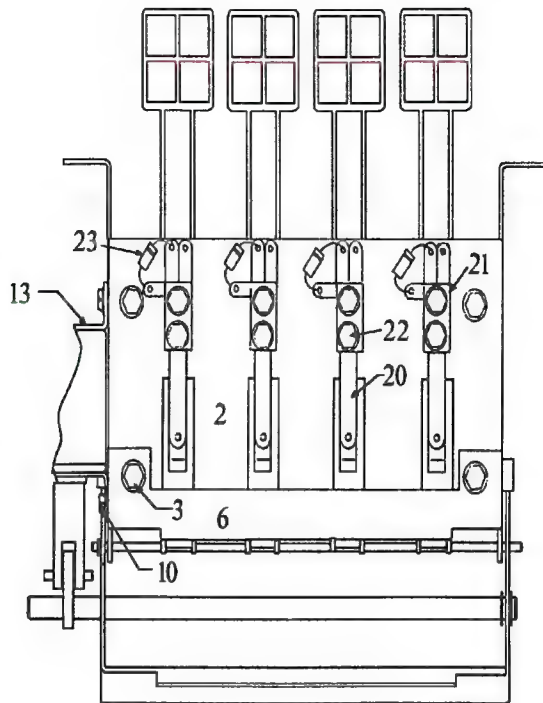
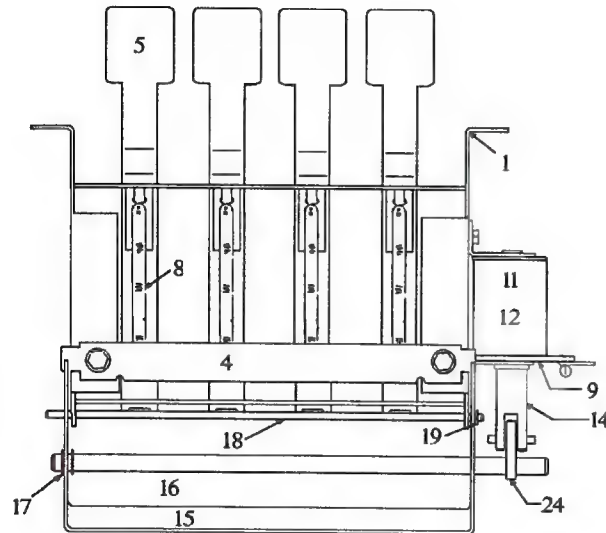




KICKBACK ASSEMBLY 500-5080-00 (COIL LUGS ON THE SIDE)
 KNOCKER ASSEMBLY 500-5081-00 (PICTURED)



Item	Description	Part No.
1	Target End Plate (2)	535-6162-00
2	Bank Target Frame	535-6159-02
3	#8-32 X $\frac{3}{8}$ Screw (6)	237-5879-00
4	Spring Mounting Plate	535-6160-02
5	Target (4)	545-5048-01
6	Drop Tgt.Retain.Brkt.	535-5042-02
7	Washer ¹³ / ₆₄ X $\frac{1}{2}$ (2)	242-5018-00
8	Target Reset Spring (3)	265-5003-00
9	Coil Support Bracket	535-6154-00
10	#6-32 X $\frac{3}{8}$ Screw (4)	237-5877-00
11	23-800-Coil	090-5001-02
12	Coil Sleeve	260-0004-00

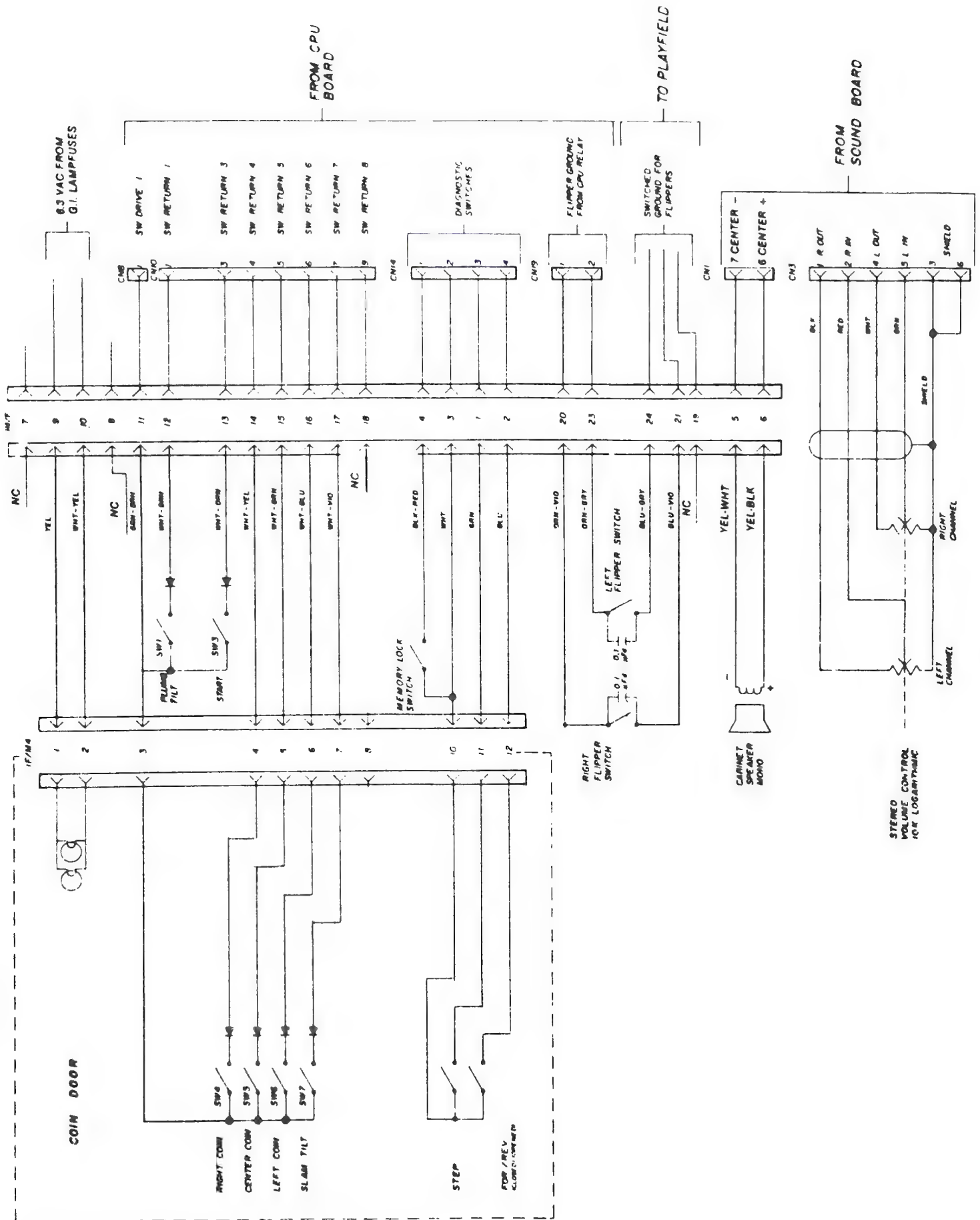


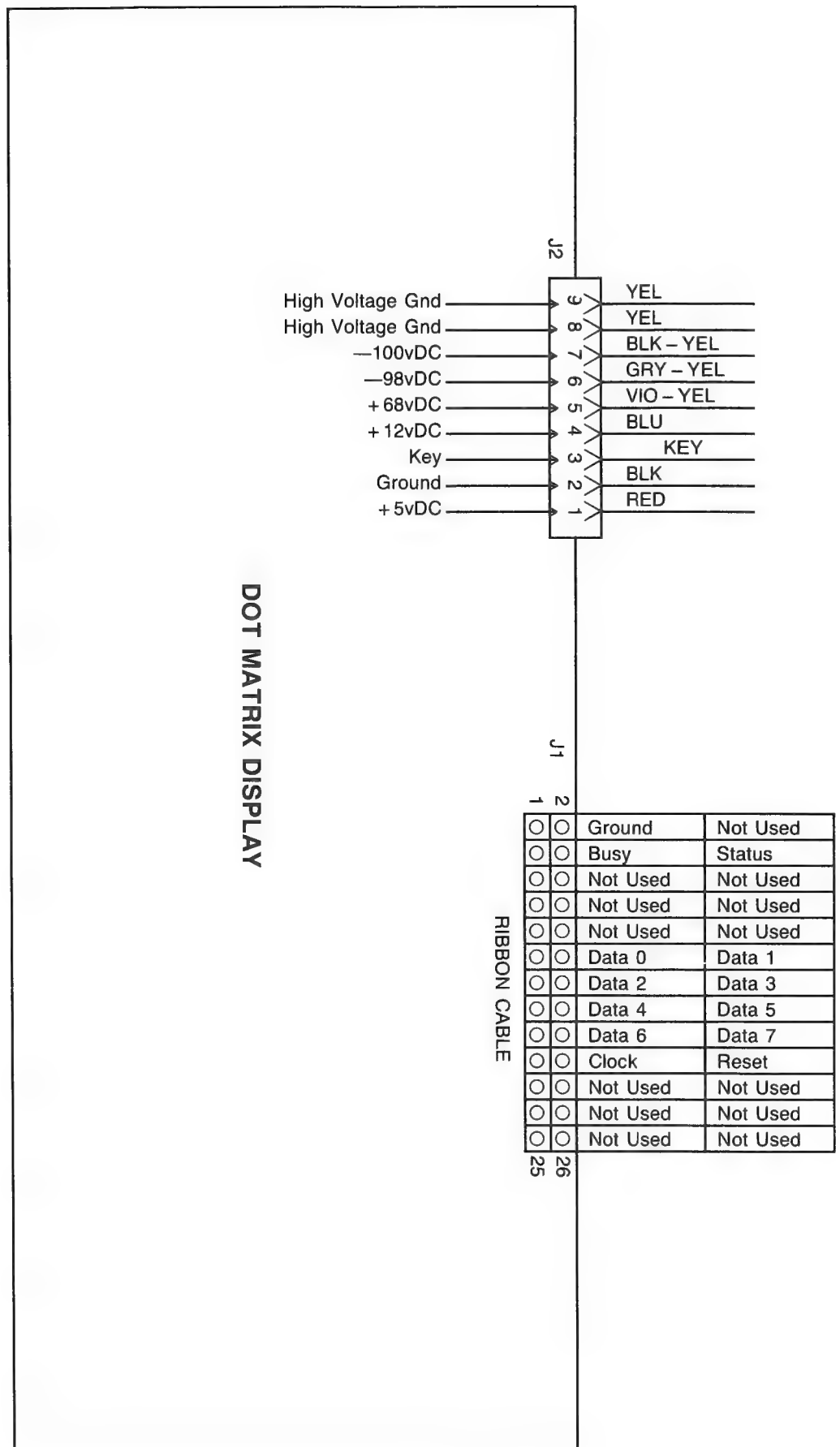
Item	Description	Part No.
13	Plunger Stop Assy.	515-5088-00
14	Plunger & Link Assy.	515-5338-00
15	Target Lift Bracket	535-6169-02
16	Target Shaft	530-5179-02
17	Retaining Ring (2)	270-5002-00
18	Pivot Shaft	530-5180-02
19	Retaining Ring (2)	270-5000-00
20	Switch (4)	180-5092-00
21	SwitchPlate (3)	535-5045-00
22	#6-32 X $\frac{1}{2}$ " (8)	237-5878-00
23	Diode 1N4001	112-5001-00
24	Link,Plunger	545-5062-00

4 Bank Drop Target Ass'y 500-5437-02

Swing Target Assembly 500-5370-00

Item	Part #	Description
1	515-5534-00	Motor Assy.
2	232-5200-00	Scr 6-32X ¹ / ₄ PHP,SEMS.
3	515-5454-00	Drive & Tgt.arm Assy.
4	515-5442-00	Drive Cam & Stud Assy.
5	515-5455-00	Short Tgt.arm Assy.
6	515-5456-00	Long Tgt.arm Assy.
7	270-5002-00	"E"Ring ¹ / ₄ "
8	265-5021-00	Spring, Tgt.arm
9	180-5081-08	Target Switch Rnd.Wht.
10	232-5002-00	SCR,PHP #6 X ⁵ / ₈
11	240-5307-00	Nut,#6-32 KEPS
12	626-5011-01	Foam, ³ / ₈ X ⁵ / ₈ X ¹ / ₄
13	237-5839-00	Set Scr.HXHD #8-32X ³ / ₈







FOR LOWER LINE VOLTAGES
OR 230 VOLT OPERATION
SEE SAMPLES BELOW

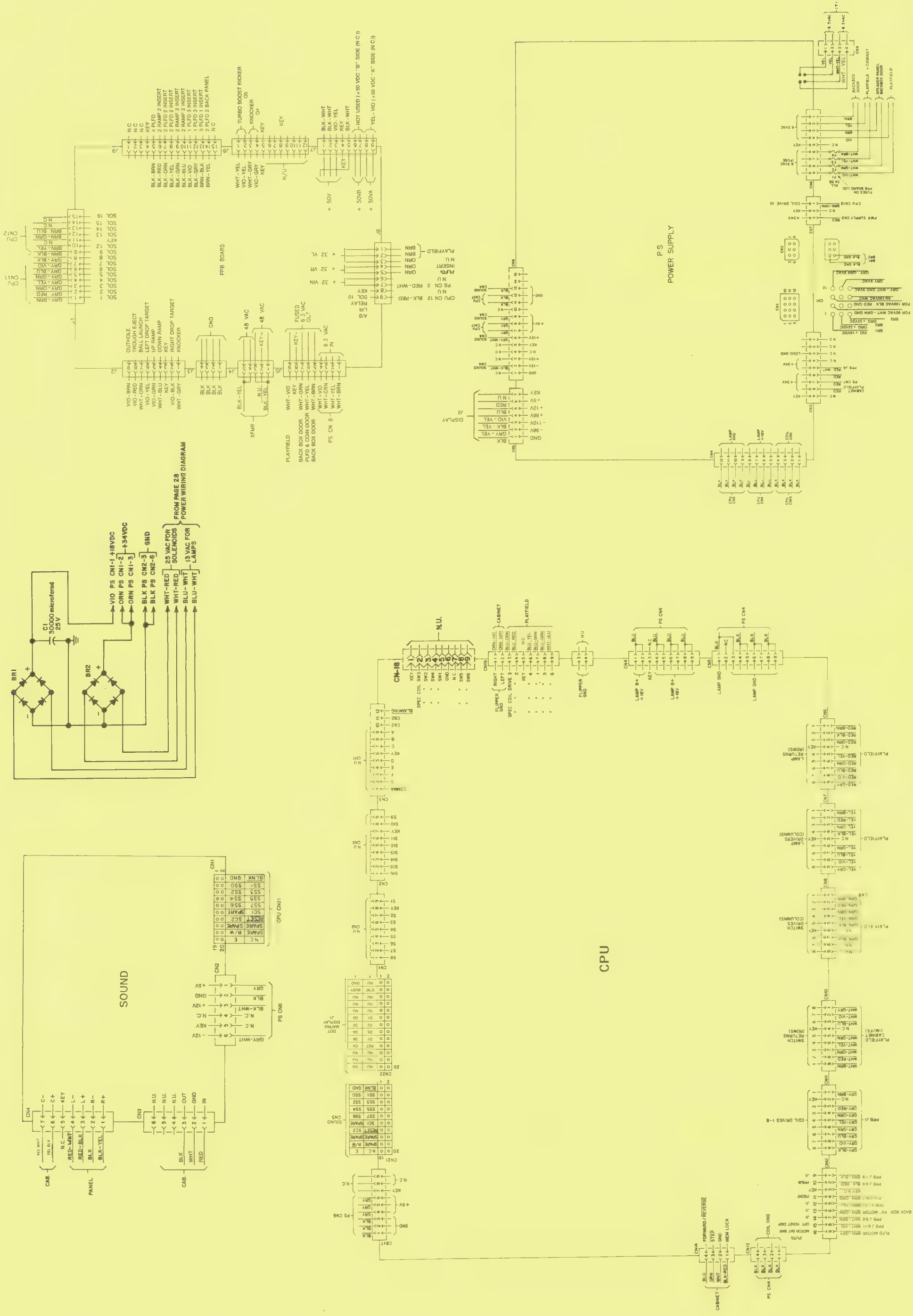
JUMPERS FOR VOLTAGE VARIATION

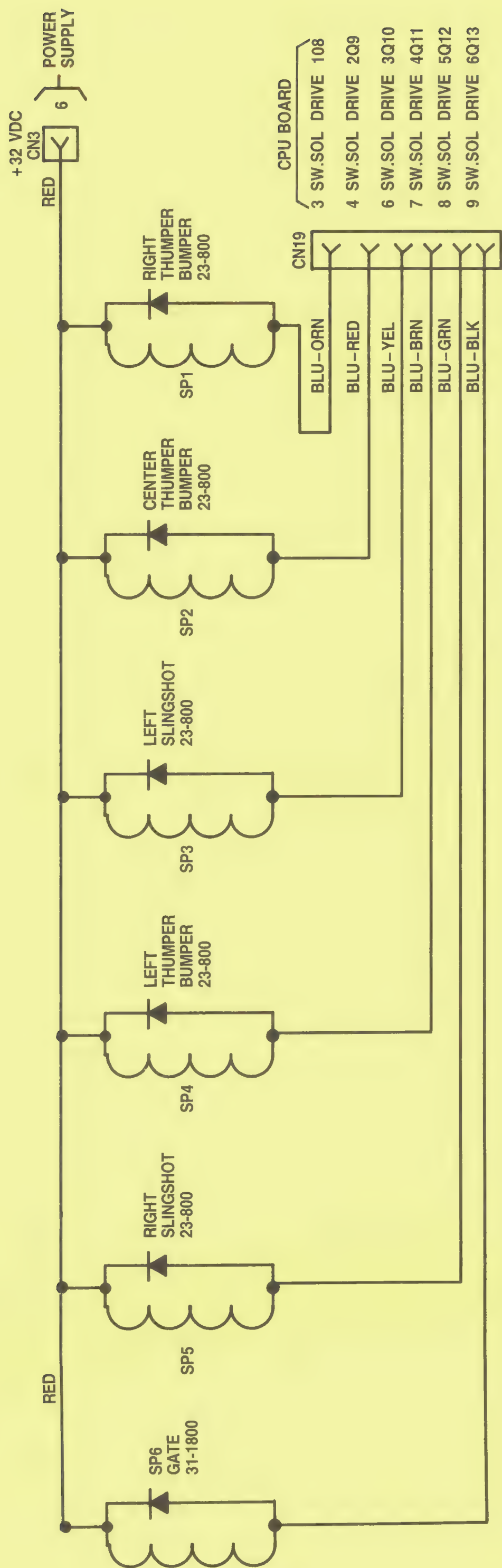
230/218/206 VOLTS

IF1 - 4A SLO BLO

1/4W • 275V VARISTOR

191

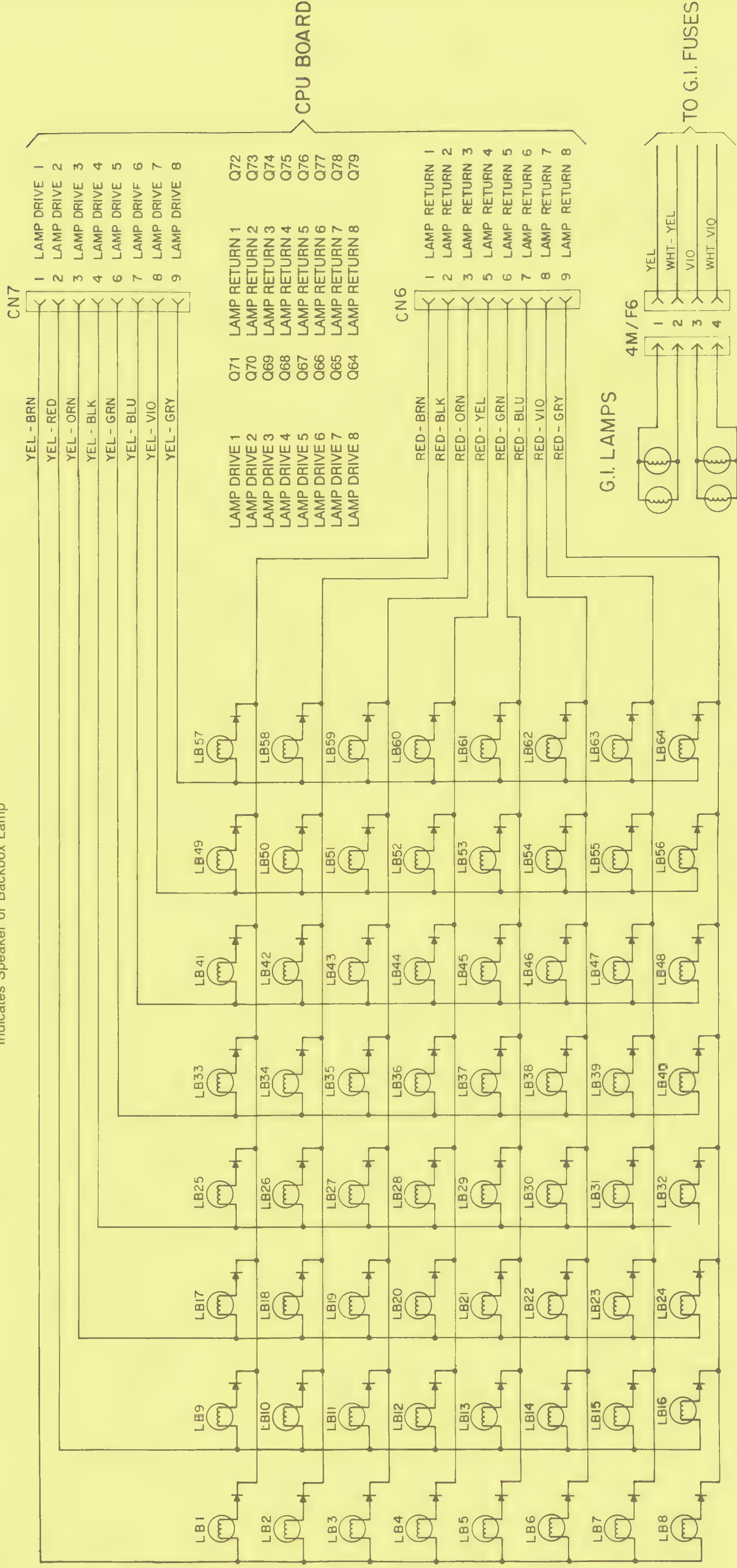


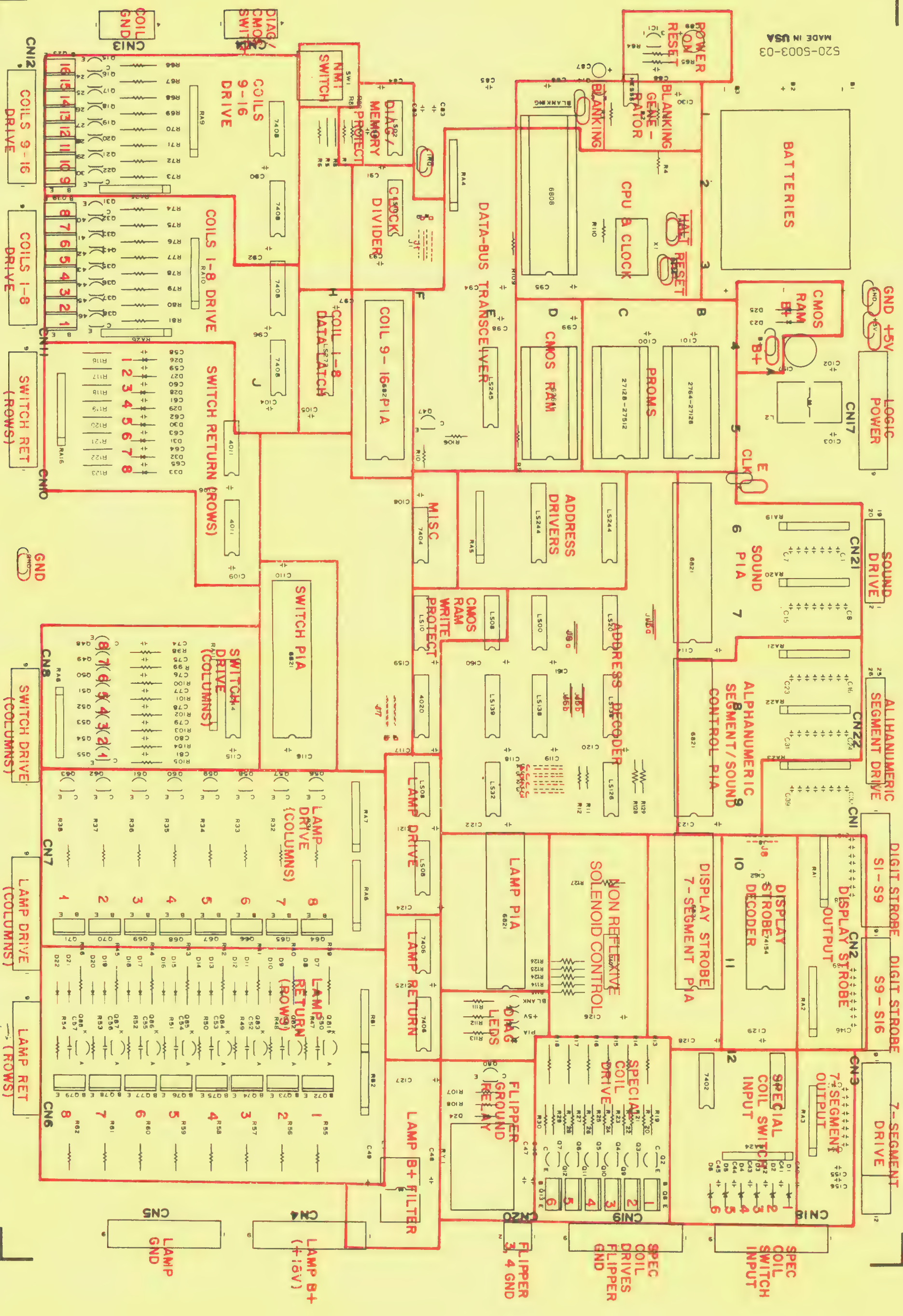


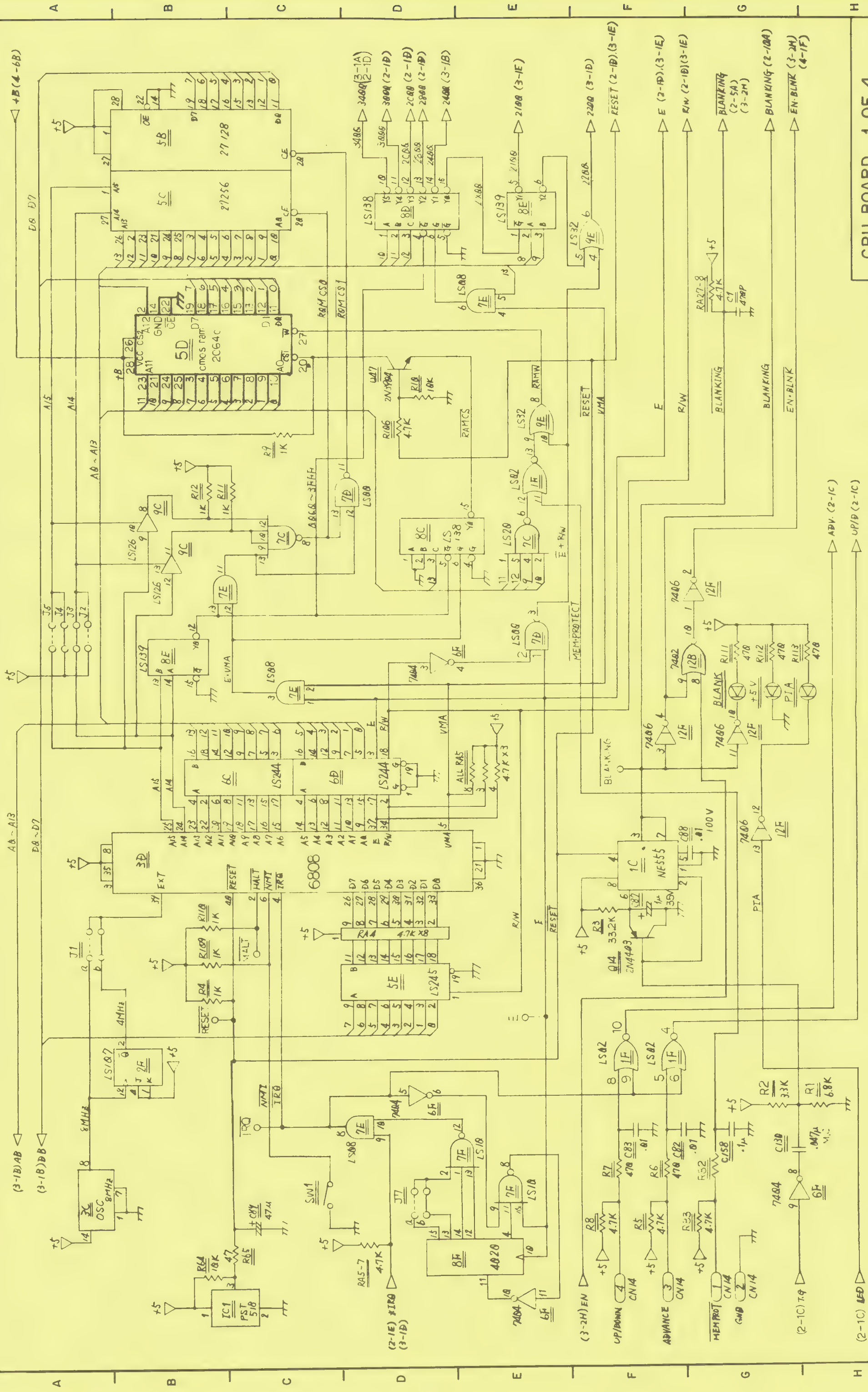
Lamp Number Description

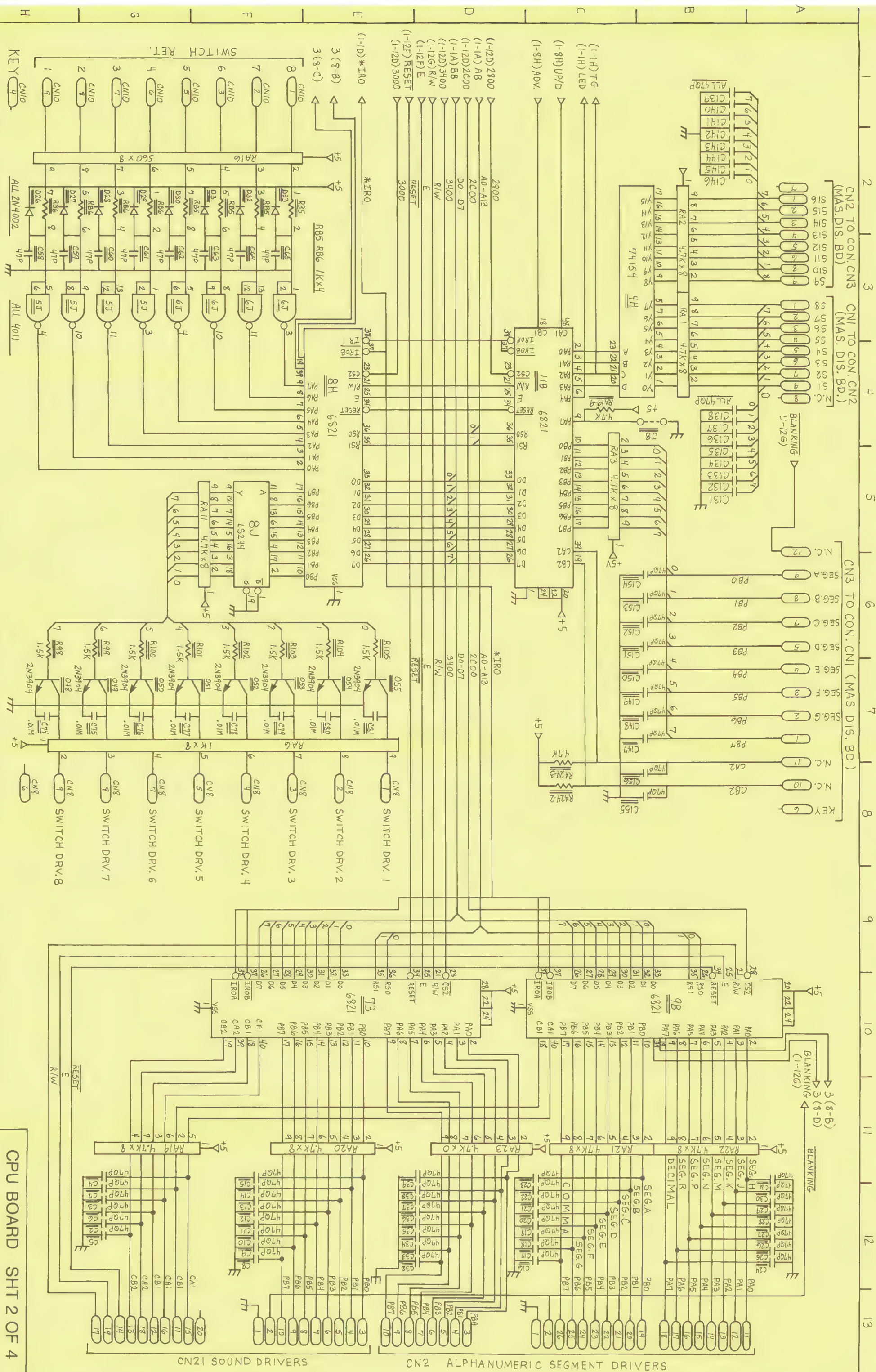
01	2X	17	Right Phaser #1	33	Left Top Lane	49	Shoot Again
02	4X	18	Right Phaser #2	34	Center Top Lane	50	Left & Right Turbo Bumper
03	6X	19	Right Phaser #3	35	Right Top Lane	51	Unlimited Millions
04	8X	20	Right Phaser #4	36 *	Backbox #5	52	Playfield Crystal #4 Left
05	10X	21	Right Phaser #5	37	Ships Body	53	Crystal Bank #1
06		22 *	Backbox #3	38	Laser Kick	54	Crystal Bank #2
07		23	Ice Planet 10 Million	39	Playfield Crystal #6	55	Crystal Bank #3
08 *		24	Playfield Crystal #8	40	Left Shields On	56	Crystal Bank #4
09		25	Extra Ball Arrow	41	Ships Left Engine	57	Crystal Bank #5
10		26	Playfield Crystal #2	42	Ships Right Engine	58	Crystal Bank #6
11		27	Right Scoop	43	Jackpot Arrow	59	Crystal Bank #7
12		28	Playfield Crystal #1	44	Left Ramp Red	60	Crystal Bank #8
13		29 *	Backbox #4	45	Left Million Green	61	Crystal Bank #9
14		30	Ball Launch Button	46	Lite Scanner Arrow	62	Playfield Crystal #4 Right
15 *		31	Cabinet Start Button	47	Playfield Crystal #9	63	Right Million Green
16		32	Re-Lite Laser Kick	48	Right Shields On	64	Right Ramp Red

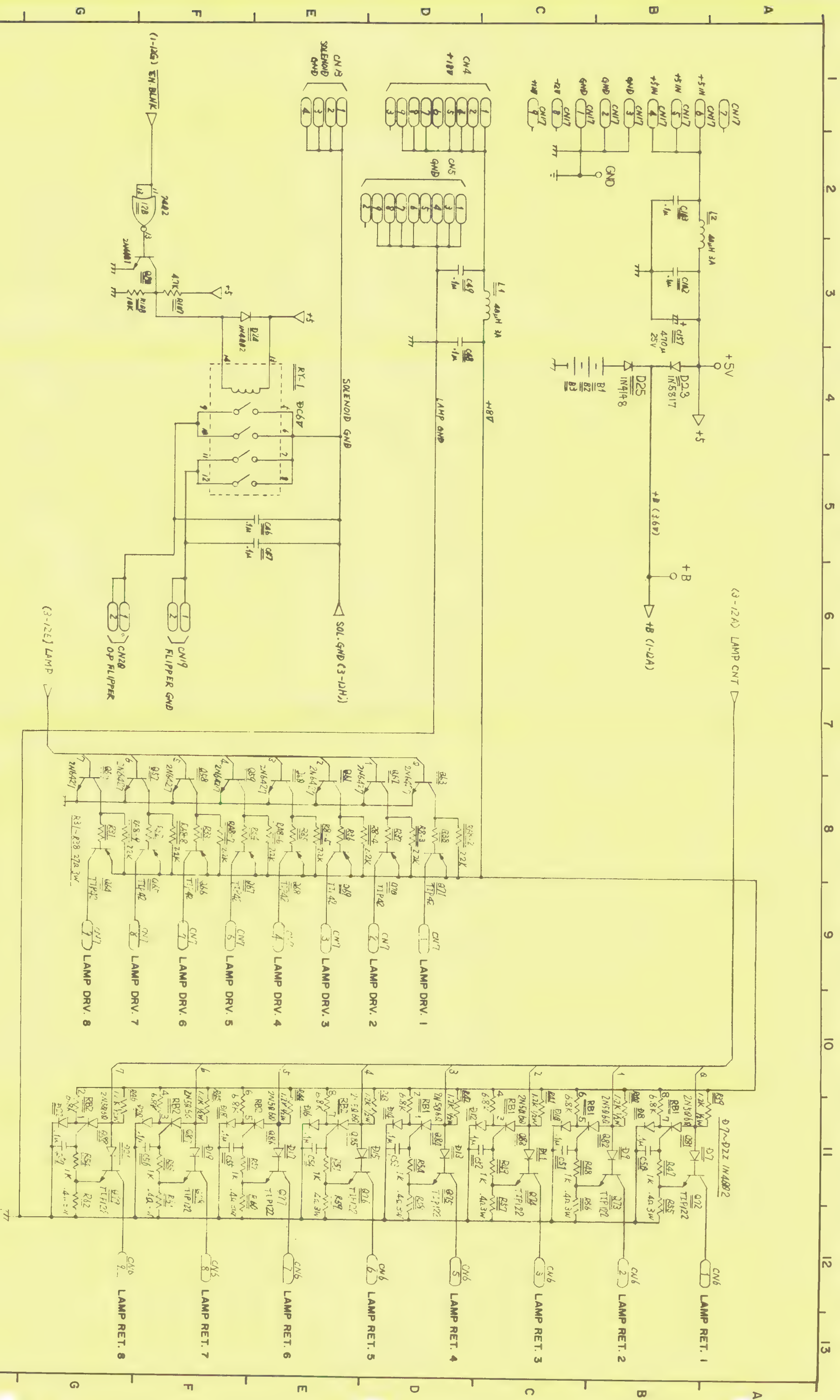
*Indicates Speaker or Backbox Lamp

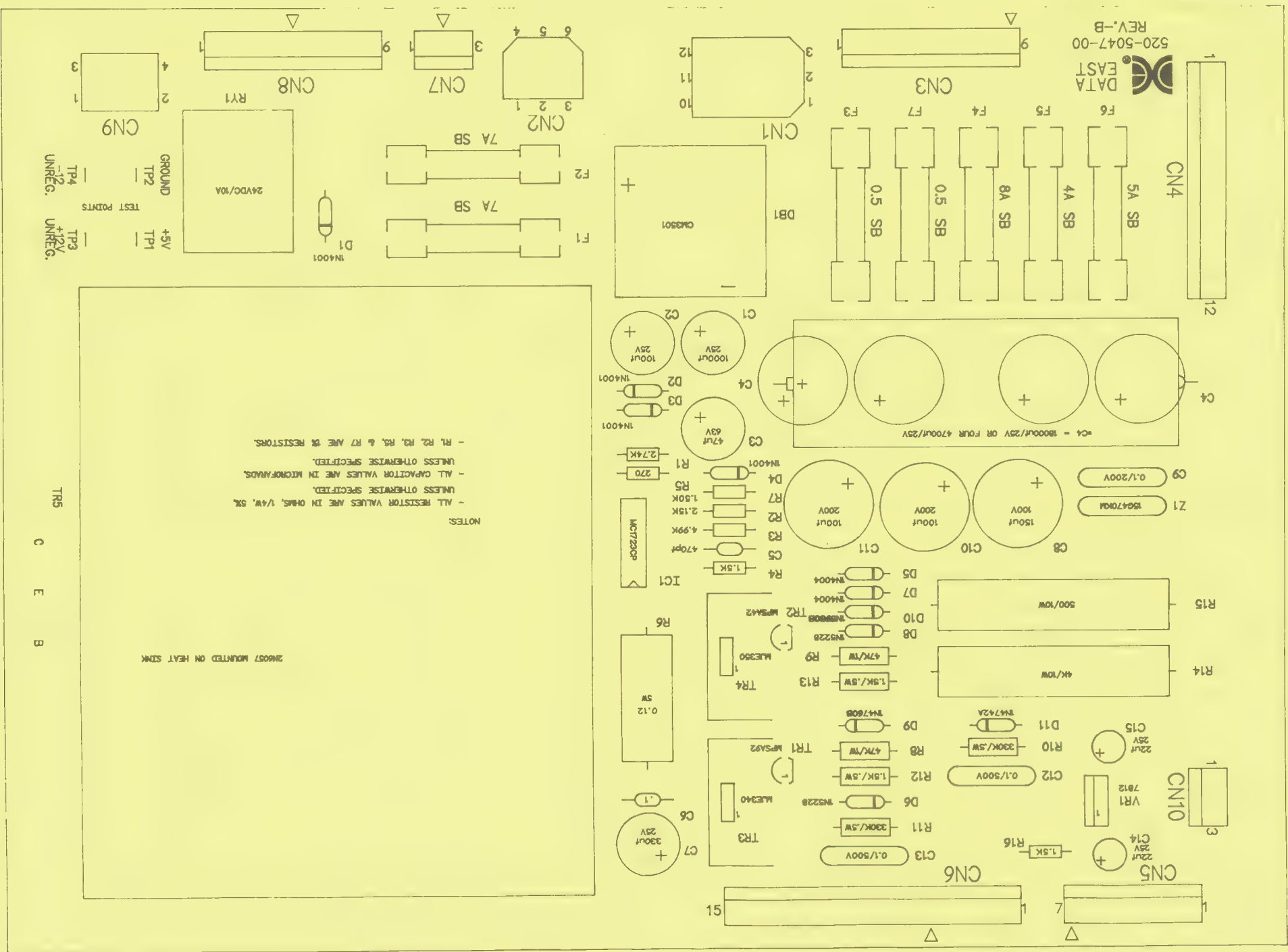
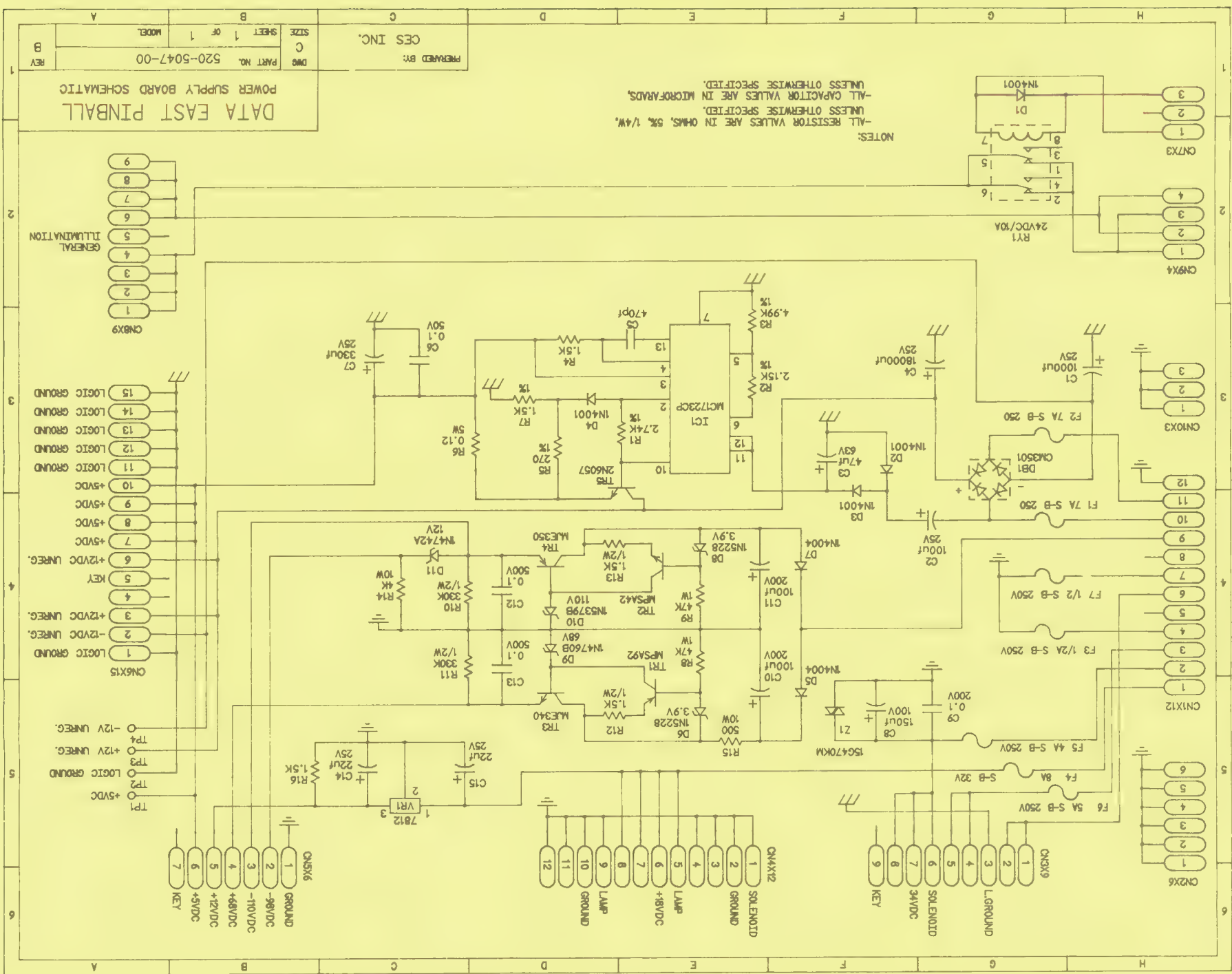


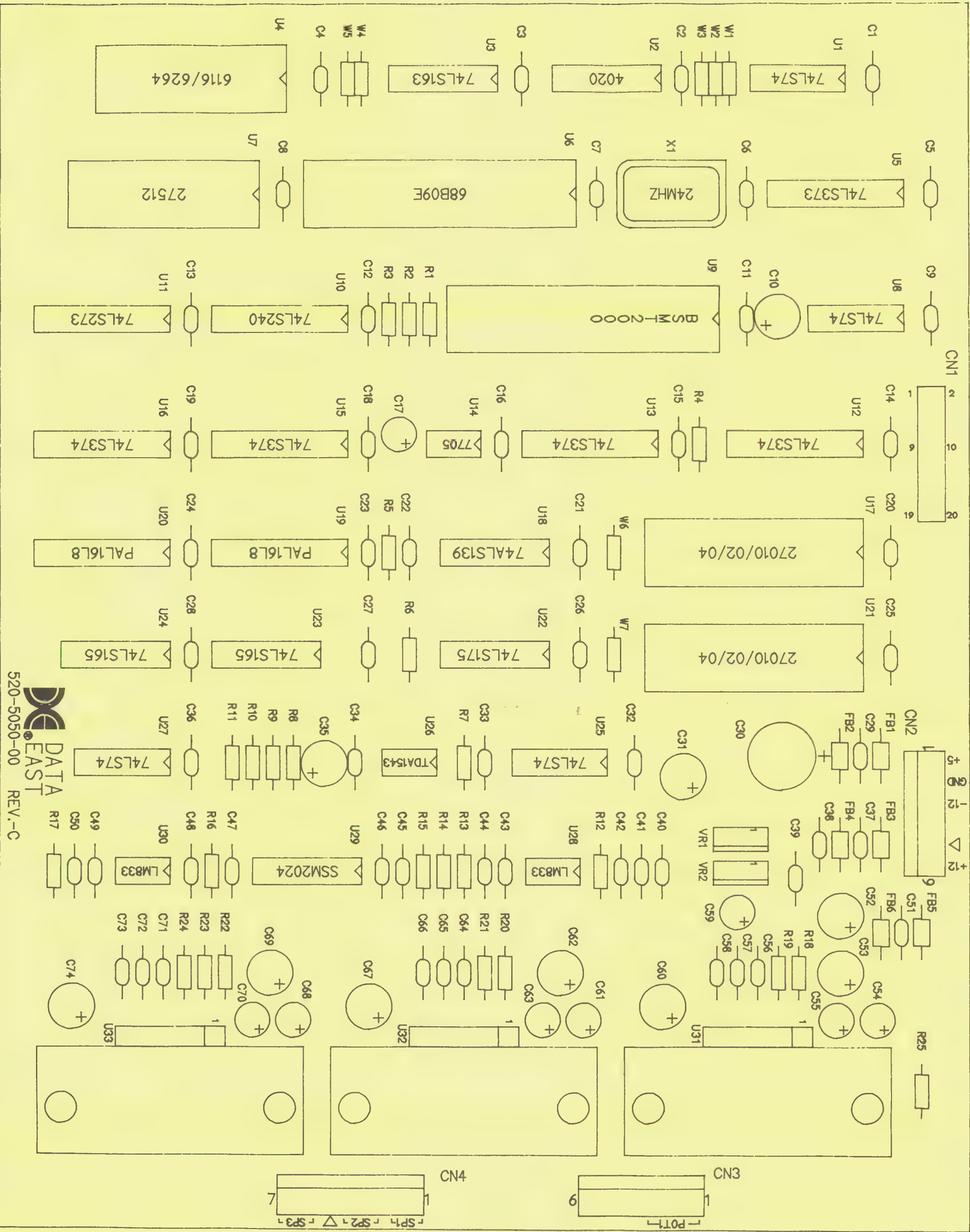


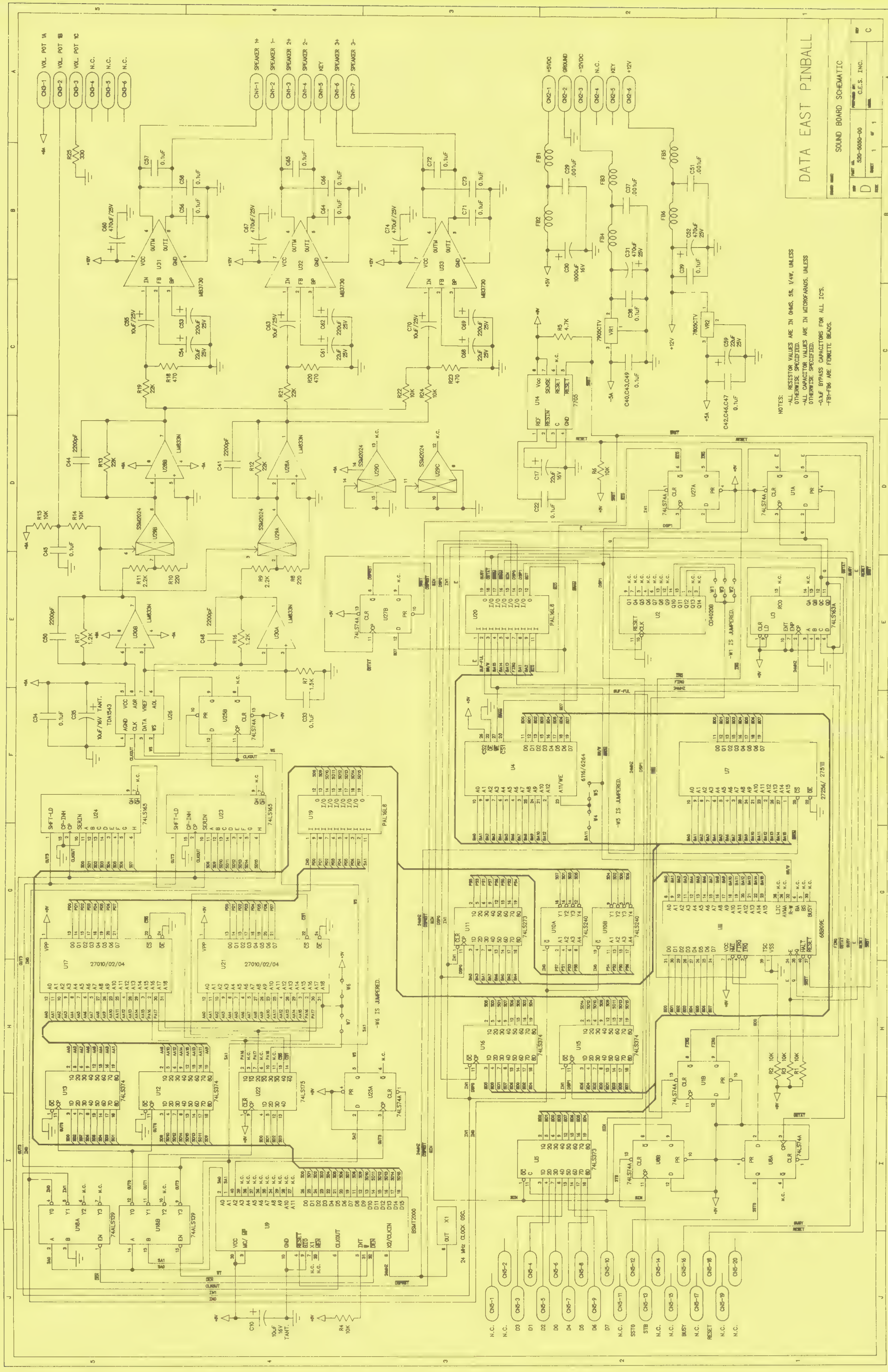










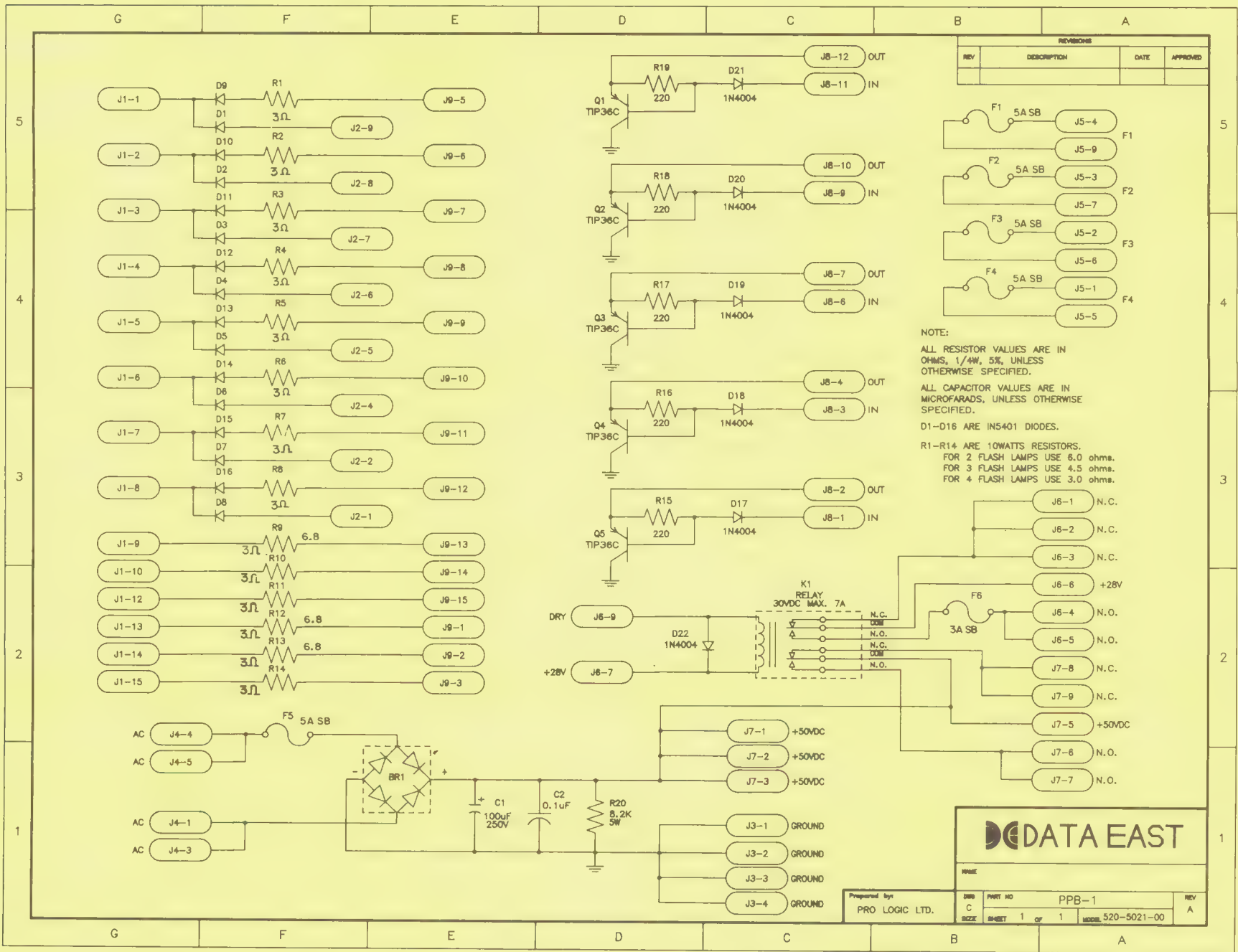
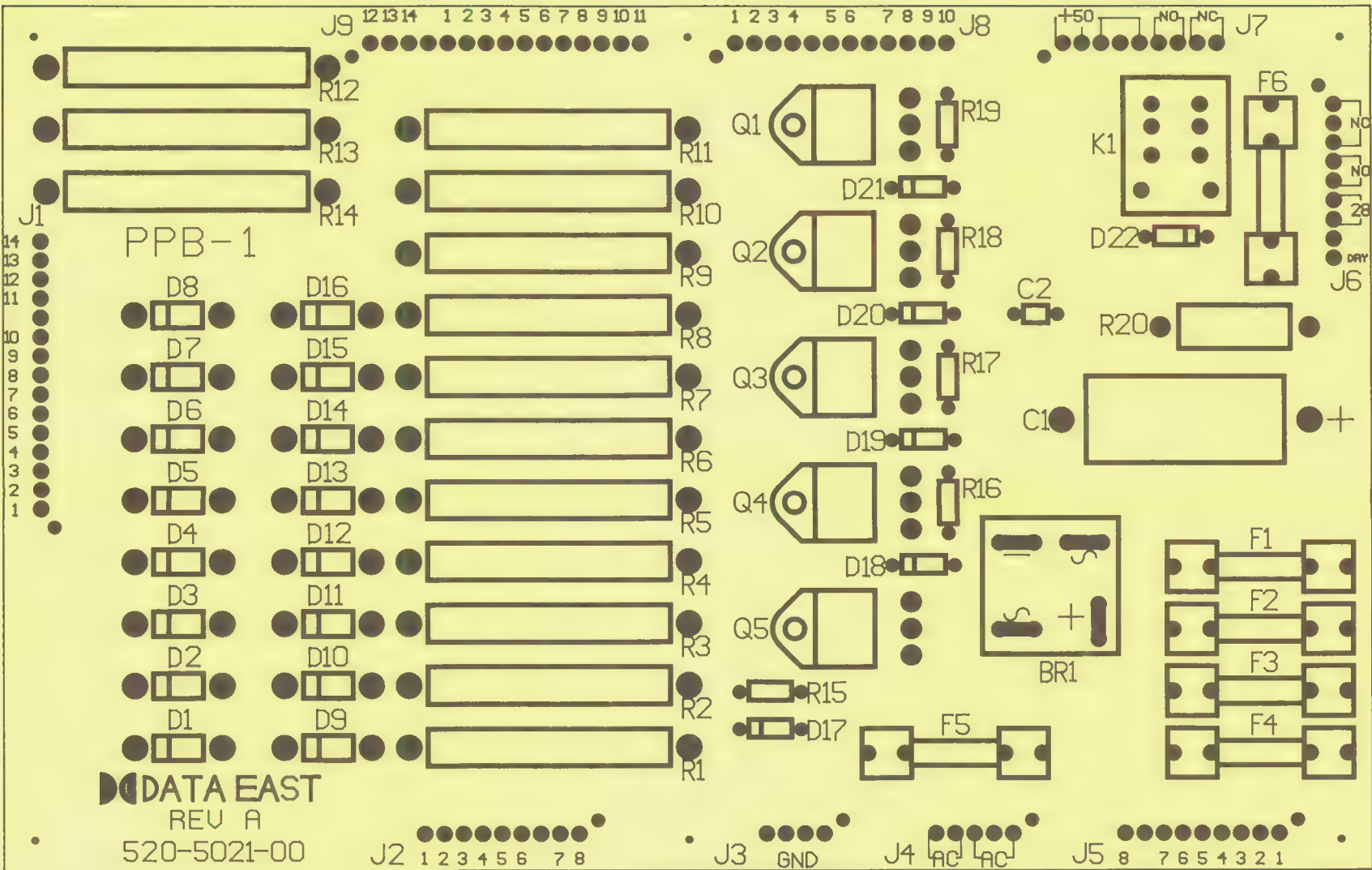


NOTES:
-ALL RESISTOR VALUES ARE IN OHMS, SR. 1/4W, UNLESS OTHERWISE SPECIFIED.
-ALL CAPACITOR VALUES ARE IN MICROFARADS, UNLESS OTHERWISE SPECIFIED.
-0.1UF BIPASS CAPACITORS FOR ALL IC'S.
-FB1-FB6 ARE FERRITE BEADS.

DATA EAST PINBALL

SOUND BOARD SCHEMATIC

REV	DATE	BY	CHKD
D	12-1-80	W	W
1	12-1-80	W	W





Theory of Operation for the Solid State Flippers

- The solid state flipper board is a dual flipper solenoid driver circuit. Each solenoid driver circuit contains a one shot timer, a 50V driver, and an 8V driver.

Looking at one circuit, Schmidt NAND gates U1A, U1B, and U1D make up the one shot timer. The timer length is controlled by R10, R33 and C2. The output of the timer is gated at U1C with the buffered switch input from Q6. The output of U1C controls the 50V driver circuit consisting of Q4, Q1, Q2, Q3, and D1. As long as the flipper button is activated, Q6 will keep the 8V driver circuit, SR1, on.

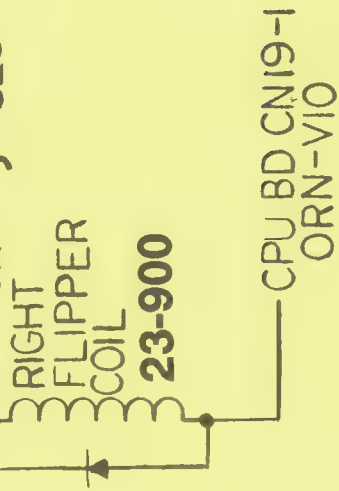
The 50V provides the actuation power to the flipper solenoid while the 8V provides the holding power.

Solid State Flippers
PCB Wiring Diagram

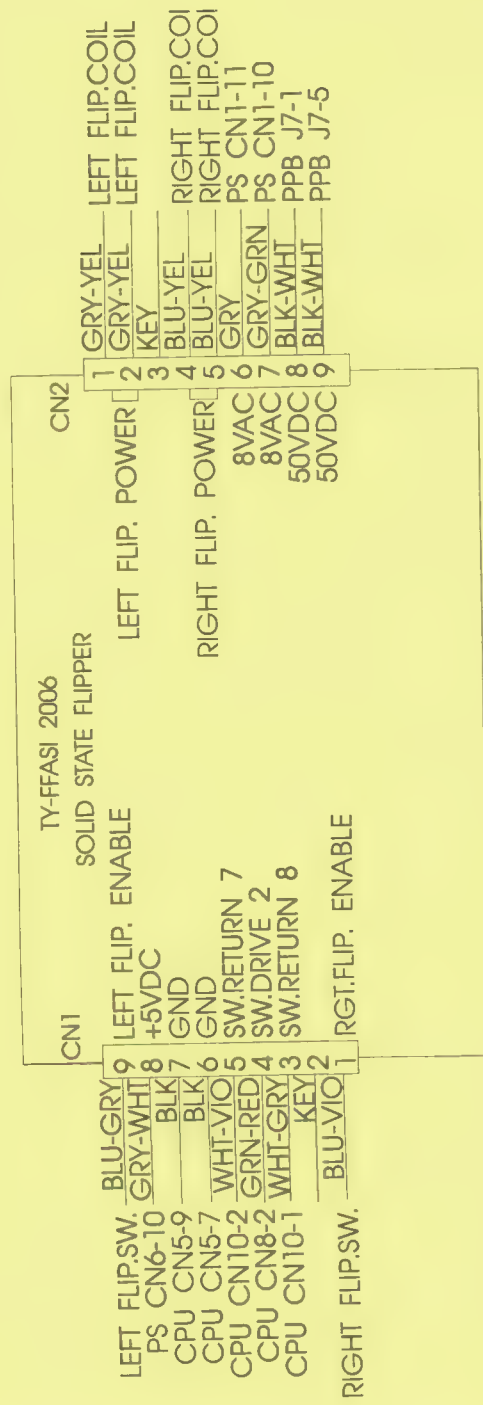
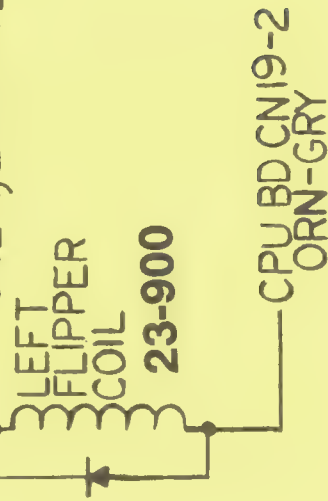
Connector CN 1			
Pin #	Goes To	Wire Color	It Is
1	Rgt. Flipper Sw.	BLU-VIO	RGT. FLIP ENABLE
2			KEY
3	CPU CN10-1	WHT-GRY	SW. RET 8
4	CPU CN8-2	GRN-RED	SW. DRV 2
5	CPU CN10-2	WHT-VIO	SW. RET 7
6	CPU CN5-7	BLK	GND
7	CPU CN5-9	BLK	GND
8	PS CN6-10	GRY-WHT	+5VDC
9	Lft. Flipper Sw.	BLU-GRY	LFT. FLIP ENABLE

Connector CN 2			
Pin #	Goes To	Wire Color	It Is
1	Lft. Flip Coil	GRY-YEL	LFT. FLIP POWER
2			KEY
3			KEY
4			KEY
5	Rgt. Flip Coil	BLU-YEL	RGT. FLIP POWER
6			KEY
7	PS CN1-11	GRY	9 VAC
8	PS CN1-10	GRY-GRN	9 VAC
9	PPB J7-1	BLK-WHT	50 VDC
	PPB J7-5	BLK-WHT	50 VDC

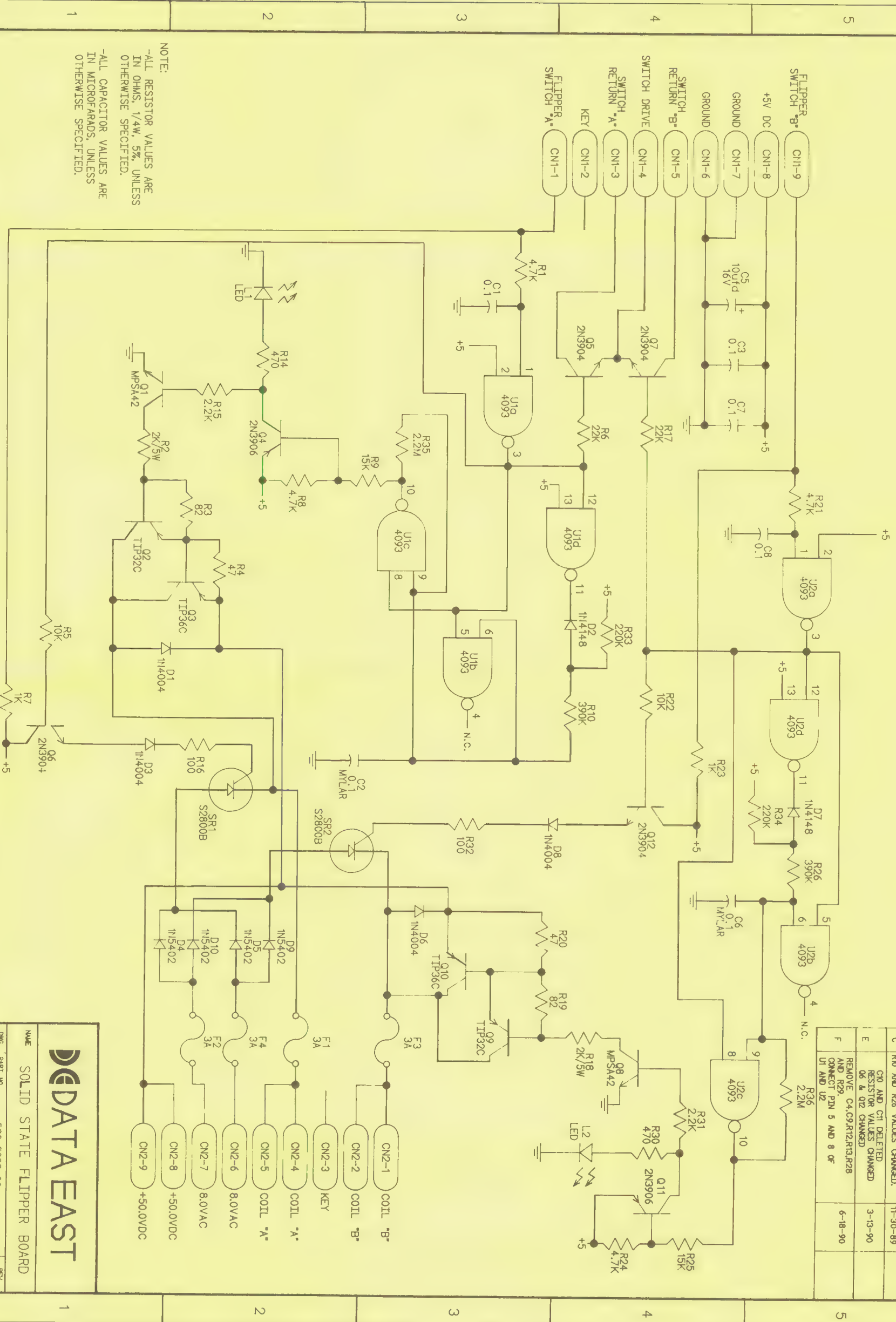
SOLID STATE P.S. BD.
CN2-4,5 BLU-YEL



SOLID STATE P.S. BD.
CN2-1,2 GRY-YEL



REVISIONS		
REV	DESCRIPTION	DATE
C	R10 AND R26 VALUES CHANGED.	11-30-89
E	C10 AND C11 DELETED RESISTOR VALUES CHANGED Q8 & Q2 CHANGED	3-13-90
F	REMOVE C4,C9,R12,R13,R28 AND R29. CONNECT PIN 5 AND 8 OF U1 AND U2	6-18-90

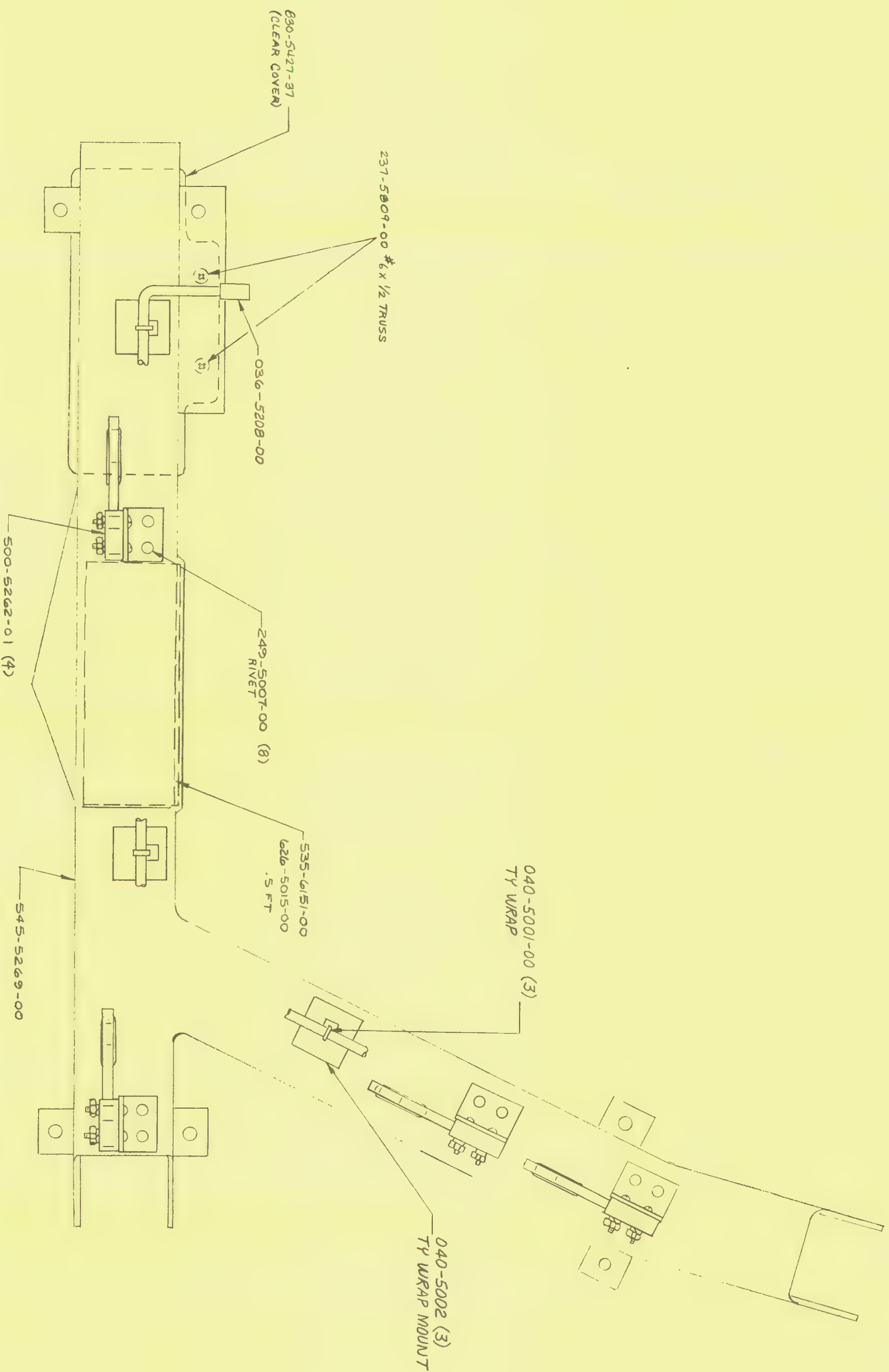


NOTE:
-ALL RESISTOR VALUES ARE
IN OHMS, 1/4W, 5%, UNLESS
OTHERWISE SPECIFIED.
-ALL CAPACITOR VALUES ARE
IN MICROFARADS, UNLESS
OTHERWISE SPECIFIED.

DEDATA EAST

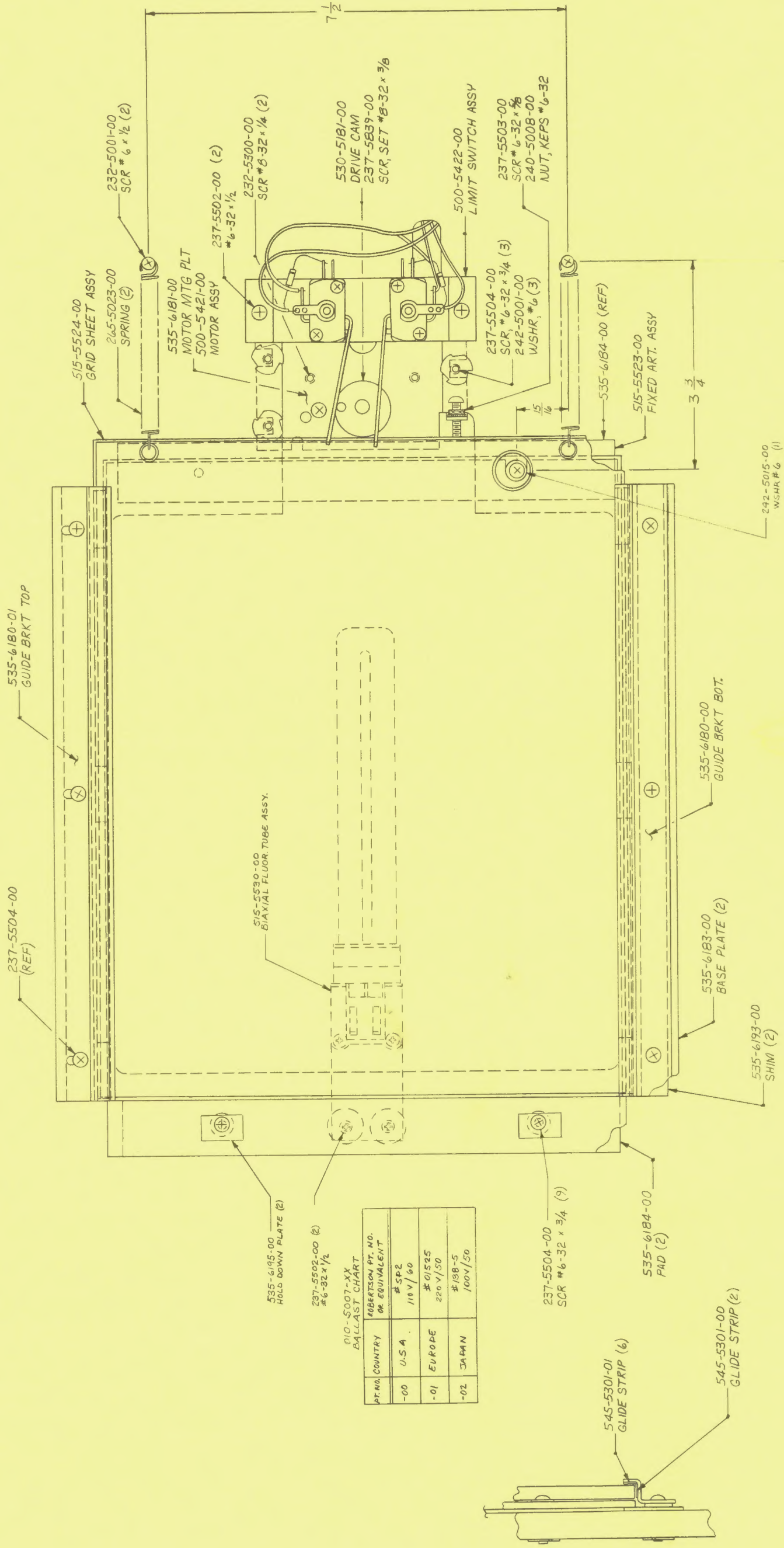
NAME SOLID STATE FLIPPER BOARD

REV	DATE	APPROVED
C	11-30-89	
E	3-13-90	
F	6-18-90	



TOLERANCE UNLESS
OTHERWISE SPECIFIED
DIM X.X ± .05 X.XX ± .005
X.XX ± .015 X.XXXX ±
ANGULAR
XX ± 1° FRACTIONAL ± 1/64

REQ.	1	NEXT ASSEMB.	DRAW.	JLL	DATE	TITLE
MAT.	X		CRTD.		4.26.91	BOTTOM RAMP ASSY
H.T.	X				SCALE 1:1	
FIN.	X					
					DATA EAST PINBALL, INC. 1990 JANICE AVE., MELROSE PARK, IL. 60160	
					PART NO. 500-5400-00	



010-5007-XX
EXALST CHART

PT. NO.	COUNTRY	ROBERTSON PT. NO. OR EQUIVALENT
-00	U.S.A.	# SP2 110 V/60
-01	EUROPE	# 01525 220 V/50
-02	JAPAN	# 188-5 100V/50

BACKSIDE OF ASSEMBLY
545-5289-00 LIGHT DEFUSER (WHITE MYLAR)
545-5298-00 REFLECTOR (MIRROR)

S/T INSERT/SPECIAL EFFECT UNIT/IN-HOUSE ASSY.

SCALE 1:1
DATE 9-30-91
APPROVED BY
DRAWN BY

DRAWING NUMBER

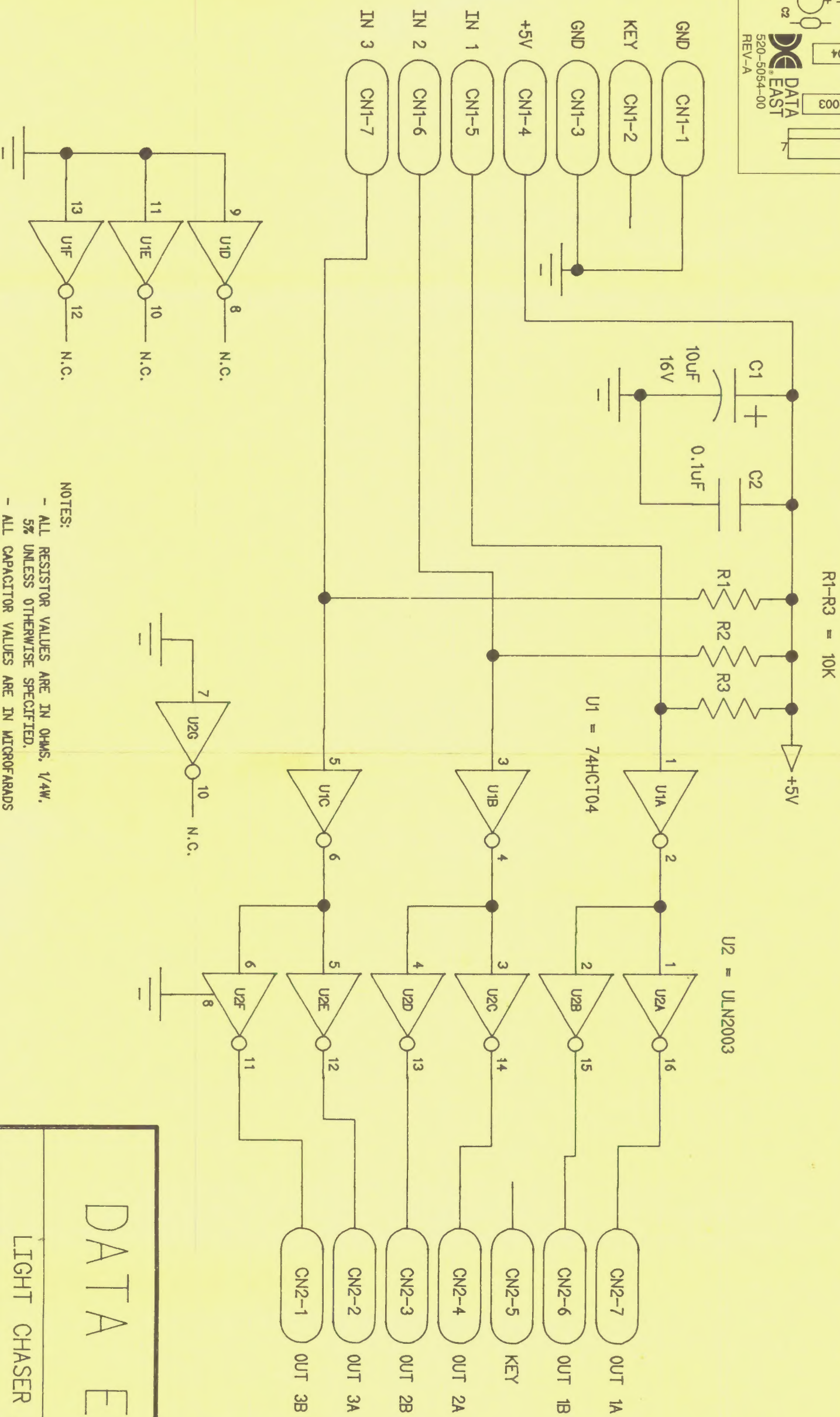
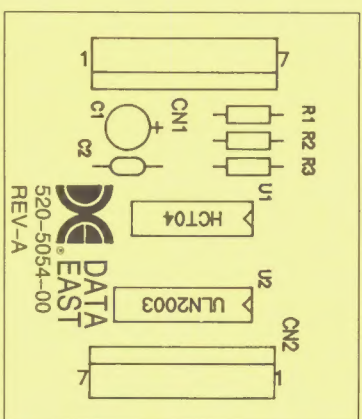
4

3

2

1

REVISIONS		
DESCRIPTION	DATE	APPROVED



NOTES:
- ALL RESISTOR VALUES ARE IN OHMS, 1/4W,
5% UNLESS OTHERWISE SPECIFIED.
- ALL CAPACITOR VALUES ARE IN MICROFARADS
UNLESS OTHERWISE SPECIFIED.

DATA EAST

LIGHT CHASER BOARD

SIZE PART NO.

B 520-5054-00

REV.

A

PREPARED BY: C.E.S. INC.

SHEET 1 OF 1

DATA EAST LIMITED WARRANTY

Data East USA, Inc., ("Seller") warrants only to the initial purchaser of its products that the items listed below are free from defects in material and workmanship under normal use and service for the warranty period specified:

PRINTED CIRCUIT BOARDS (GAME LOGIC) 60 DAYS

No other parts of Seller's product are warranted.

Warranty periods are effective from the initial date of shipment from Seller to its authorized distributors.

Seller's sole liability shall be, at its option, to repair or replace products which are returned to Seller during the warranty periods specified, provided:

1. Seller is notified promptly upon discovery by purchaser that stated products are defective.
2. Such products are properly packaged and then returned freight prepaid, to Seller's plant.

This warranty does not apply to any parts damaged during shipment and/or due to improper handling, or due to improper installation or usage, or alteration. In no event shall the Seller be liable for any anticipated profits, loss of profits, loss of use, accidental or consequential damages or any other losses incurred by the customer in connection with the purchase of a Data East USA., product.

WARRANTY DISCLAIMER

EXCEPT AS SPECIFICALLY PROVIDED IN A WRITTEN CONTRACT BETWEEN SELLER AND PURCHASER, THERE ARE NO OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

WARNING--This equipment generates, uses, and can radiate radio frequency energy, and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

